

**HUMAN AND ECOLOGICAL RISK CHARACTERIZATION
IR SITES 1 AND 2
OLD BASE LANDFILL AND FIRE TRAINING AREA**

**NAVAL TRAINING CENTER
BAINBRIDGE, MARYLAND**

Contract No. N62472-92-D-1296
Contract Task Order No. 0059

Prepared for

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LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
COPC	Constituents of Potential Concern
CTO	Contract Task Order
DRO	Diesel Range Organics
EA	EA Engineering, Science, and Technology
E&E	Ecology and Environment, Inc.
EFA CHES	Engineering Field Activity - Chesapeake
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
FTA	Fire Training Area
GRO	Gasoline Range Organics
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IR Program	Installation Restoration Program
IRIS	Integrated Risk Information System
IRM	Interim Remedial Measure
L	Liter(s)
NAVFAC	Naval Facilities Engineering Command
NTC	Naval Training Center - Bainbridge
OBL	Old Base Landfill
PAH	Polynuclear Aromatic Hydrocarbons
QA/QC	Quality Assurance/Quality Control
RAGS	Risk Assessment Guidance for Superfund
RfD	Reference Dose
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
SF	Slope Factor

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
μg	Microgram(s)
UCLM	Upper Confidence Limit on the Mean
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compound(s)

1. INTRODUCTION

This human health and ecological risk characterization was prepared by EA Engineering, Science, and Technology (EA) for IR Sites 1 and 2, the Old Base Landfill (OBL) and the Fire Training Area (FTA) at the former Naval Training Center–Bainbridge (NTC). This work was performed for Environmental Field Activity Chesapeake (EFA CHES), Naval Facilities Engineering Command (NAVFAC) Command under Contract No. N62472-92-D-1296, Contract Task Order (CTO) No. 0059, Contract Modification 0059-06, dated 23 December 1996.

1.1 PURPOSE AND ORGANIZATION OF THE REPORT

A two-phase Remedial Investigation (RI), based on 1991-1994 sampling media, was completed at the OBL and FTA to characterize the nature and extent of constituents of potential concern (COPC). The results of the human and ecological risk assessments revealed risks in excess of U.S. Environmental Protection Agency (EPA) Region III defined acceptable thresholds. Consequently, Interim Remedial Measures (IRMs) have been completed by the Navy at the two IR Sites in an effort to reduce the human and ecological risks to acceptable levels.

Additional sampling of surface water, sediment, and groundwater was conducted in April 1999 and human and ecological risks have been re-characterized, based on the analytical results of post-removal action sampling data. In order to minimize risk differences due to modified slope factors (SFs) or Reference Doses (RfDs), and to focus all differences onto analytical results in 1991/1994 and 1999, SFs and RfDs reported in Ecology and Environment, Inc. (E&E) 1999 were used to calculate 1999 risks. This report presents the results of the post-IRM human and ecological risk characterizations.

A discussion of the April 1999 field sampling activities are presented in the Section 1.3. The human health and ecological risk characterizations follow in Chapters 2 and 3, respectively.

1.2 BACKGROUND

In 1987, Atlantic Division, NAVFACENGCOM identified the OBL, a solid waste landfill operated from 1942 until base closure; and the FTA, as areas where potential surface or subsurface contamination may have resulted from NTC operations and disposal practices (undocumented). In 1988, as part of the Navy's Installation Restoration (IR) Program, a hydrogeologic investigation was performed by Versar, Inc. The Versar study involved the

installation of groundwater monitoring wells, with subsequent rounds of groundwater, surface water, and stream sediment sampling at each of the two locations. The objectives of the water quality impact study were to document contaminant releases and to characterize the extent of any hazardous substance migration. Versar collected samples of groundwater, surface water, and stream sediment, from both the OBL and the FTA during three sampling events.

The first phase of the Remedial Investigation (RI) for the OBL and FTA was conducted by E&E in 1990 and 1991, with the second phase conducted between 1993 and 1994. Based on sampling data from 1991 to 1994, a Hazard Index (HI) greater than 1 was calculated for future groundwater users at both the OBL and the FTA. In addition, cancer risks from ingestion of groundwater at the FTA exceeded 10^{-4} . Potential risks to ecological receptors were also identified at both IR sites.

1.3 FIELD SAMPLING ACTIVITIES

The identified RI “hotspots” were re-sampled at the OBL and FTA in March of 1999.

Old Base Landfill

Eleven groundwater samples were collected using U.S. EPA low-flow sampling methods from existing monitoring wells at the OBL. The monitoring wells sampled included 1-GW-1, 1-GW-3, 1-GW-5, and 1GW-6 through 1-GW-13 (Figure 1-1). Groundwater samples were analyzed for Target Compound List (TCL) Volatile Organic Compounds (VOC), TCL Polynuclear Aromatic Hydrocarbons (PAH), TCL Pesticide/PCB (polychlorinated biphenyls), Target Analyte List (TAL) metals (total) and cyanide, and Total Petroleum Hydrocarbons (TPH) [diesel range organics (DRO) and gasoline range organics (GRO)].

Six sediment samples, P1-SD-7, P1-SD-9, P1-SD-11, 1-SD-8, 1-SD-10 and 1SD-18, were collected from locations that approximated the previous RI sediment sample locations at the OBL. With the exception of the sediment sample 1-SD-18, sediment samples were analyzed for TCL VOC, TCL PAH, TCL Pesticide/PCB, TAL metals and cyanide, and TPH (DRO and GRO). Sediment samples were also analyzed for total organic carbon (TOC) and grain size distribution (in accordance with ASTM Method 422). The sediment sample at 1-SD-18 was analyzed for pesticides only.

Five surface water samples, P1-SW-7, P1-SW-11, 1-SW-8, 1-SW-10 and 1-SW-16, were collected from locations that approximated the previous OBL RI surface water sample locations. Surface water samples were analyzed for TCL VOC, TCL PAH, TCL Pesticide/PCB, TAL metals and cyanide, and TPH (DRO and GRO). The metal analysis for surface water samples was performed for both total and dissolved analytes (i.e., filtered and unfiltered).

The analytical results for samples collected at the OBL are presented in Appendix A.

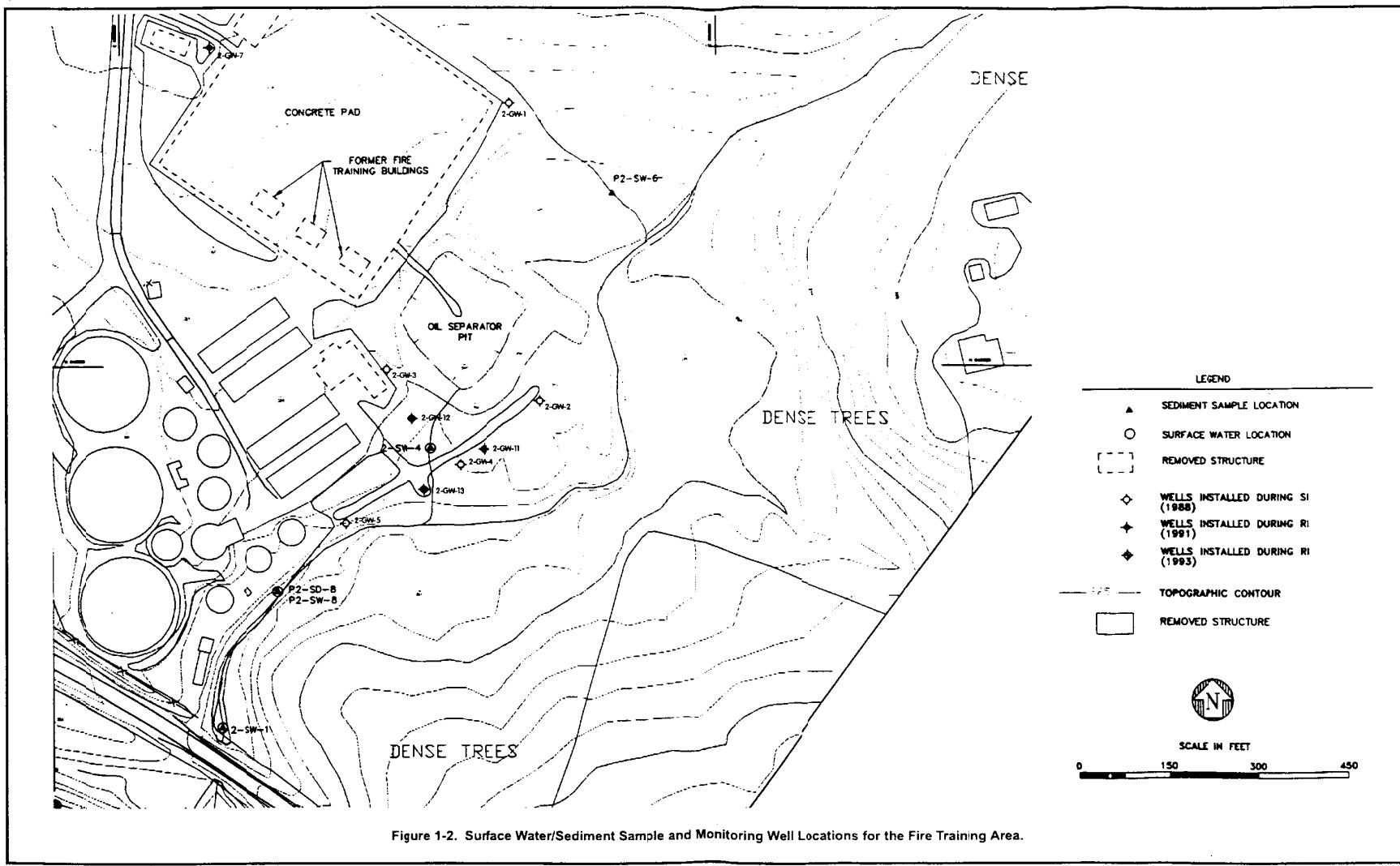
Fire Training Area

Nine groundwater samples were collected using low-flow sampling methods from existing monitoring wells at the FTA. The monitoring wells sampled included 2-GW-1 through 2-GW-5, 2-GW-7, and 2-GW-11 through 2-GW-13 (Figure 1-2). Groundwater samples were analyzed for TCL VOC, TCL PAH, TCL Pesticide/PCB, TAL metals (total) and cyanide, and TPH (DRO and GRO).

One sediment sample was collected from the previous RI sample location, P2-SD-8. The sediment sample was analyzed for TCL VOC, TCL PAH, TCL Pesticide/PCB, TAL metals and cyanide, and TPH (DRO and GRO). The sediment sample was also analyzed for TOC and grain size distribution (in accordance with ASTM Method 422).

Four surface water samples, P2-SW-6, P2-SW-8, 2-SW-1 and 2-SW-4, were collected from locations that approximated the previous RI surface water sample locations at the FTA. Surface water samples were analyzed for TCL VOC, TCL PAH, TCL Pesticide/PCB, TAL metals and cyanide, and TPH (DRO and GRO). The metals analysis for surface water samples included both total and dissolved analytes (i.e., filtered and unfiltered).

The analytical results for samples collected at the FTA are presented in Appendix A.



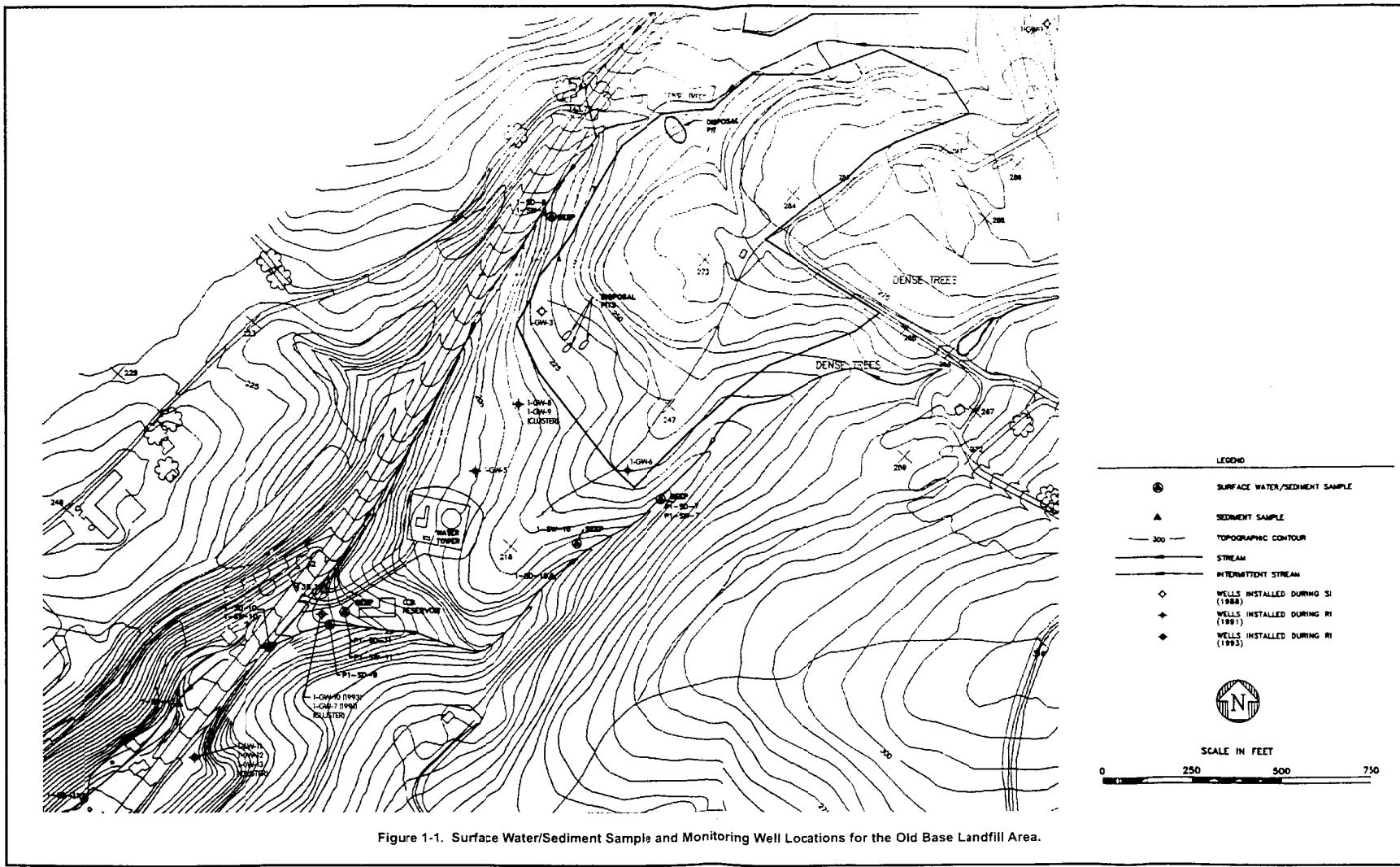


Figure 1-1. Surface Water/Sediment Sample and Monitoring Well Locations for the Old Base Landfill Area.

2. HUMAN HEALTH RISK ASSESSMENT

E&E completed a baseline human health risk assessment (HHRA) for the Old Base Landfill (OBL) and the Fire Training Area (FTA) located at the Bainbridge Naval Training Center, Port Deposit, Maryland (E&E 1999). Following this report, a removal action was completed and EA was tasked with re-sampling of “hot spots” after remediation and reassessment of human health risks based upon the new analytical results and parameters established in the E&E report. Only the groundwater pathway was found to pose unacceptable risks to human health (E&E 1999). Therefore, risks were reevaluated for the only group affected by groundwater, future adult and child residents.

E&E (1999) identified risk-drivers for groundwater exposure to child and adult residents (Table 2-1). This assessment focused on these risk-drivers, and only to the extent that they have appreciably changed. A chemical was designated as appreciably changed if the maximum concentration measured in 1991 and 1994 (presented in E&E 1999) is 20 percent higher or lower than that measured in 1999. If the maximum concentration was found to appreciably change (up or down), then new future adult and child resident groundwater risks were calculated and compared to previous risks.

This risk assessment has been prepared using the general approach outlined in the U.S. EPA’s *Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation Manual* (U.S. EPA 1989) and other related EPA guidance. The HHRA was abbreviated in light of established parameters in the E&E report. The E&E report identified the potential pathways for human exposure to site-related contaminants; established a conceptual site model; and identify site-related COPC in groundwater by a risk based screening (E&E 1999).

2.1 IDENTIFICATION OF APPRECIABLY CHANGED RISK DRIVERS

In April 1999 EA resampled 11 monitoring wells at the OBL and 9 monitoring wells at the FTA. Sampling was conducted with standard operating methods and quality assurance/quality control (QA/QC) procedures. U.S. EPA low-flow sampling procedures were used to take the monitoring well samples. Groundwater samples were analyzed for TAL metals, cyanide, and the TCL VOC, and pesticide/PCB. The maximum concentrations for risk drivers were identified and compared with 1991, 1994 maximum concentrations. Table 2-2 shows these comparisons, and as well as the 20 percent test results. Two previously identified risk drivers (beryllium and iron in the FTA) were eliminated from further analysis because new maximums were within 20 percent of

old maximums. All other previously identified groundwater risk drivers decreased by over 20 percent, and therefore new risks were calculated.

2.2 RISK CHARACTERIZATION

2.2.1 Exposure Assumptions and Toxicity Assessment

E&E (1999) identified future adult and child residents as the only receptors exposed to groundwater. Risk estimation procedures established by the E&E report were used to calculate risks for the identified groundwater COPC. Potential exposure pathways identified for future adult residents were ingestion of groundwater while showering, dermal contact of groundwater while showering, and inhalation of volatiles from groundwater while showering (E&E 1999). For future resident children, the potential pathways identified were ingestion and dermal contact of groundwater while showering. The reasonable maximum exposure (RME) parameters are described in Section 5.3.2.3 and Table 5-18 through Table 5-20 of E&E (1999). The exposure point concentrations (EPCs) used for this reassessment were the maximum concentrations shown in Table 2-2. This is a conservative measure, as 95 % upper confidence limits on the mean (UCLMs) are typically lower than maximum concentrations. As was performed in E&E (1999), risks due to adult inhalation of volatiles from groundwater while showering have been calculated using a model obtained from Region III, based on Foster and Chrostowski 1987 (Appendix K, E&E 1999).

Toxicity values including reference doses (RfDs) for noncarcinogens and cancer slope factors (SFs) were those provided in E&E (1999), specifically Tables 5-22, 5-23, and 5-24 for SFs and RfDs.

2.2.2 Risk Estimates

Detailed tables containing estimates of potential exposures and associated risks for the future adult and child residents due to exposure to groundwater can be found in Appendix B. Tables 2-3 and 2-4 summarize total groundwater risk due to all exposure pathways and compares the new risks to old risks calculated in the E&E report for the OBL site for future adult and child residents. Tables 2-5 and 2-6 summarize total groundwater risk due to all exposure pathways and compares the new risks to old risks calculated in the E&E report for the FTA site for future adult and child residents.

2.2.2.1 Risks at the Old Base Landfill

Under RME assumptions, the estimated potential excess lifetime cancer risk associated with future adult residents is $5.6 \text{ H} 10^{-5}$ (Table 2-3) for chemicals identified as risk drivers in the E&E report. For future child residents, the estimated cancer risk is $2.8 \text{ H} 10^{-5}$ (Table 2-4).

Because 1,4-dichlorobenzene had not been analyzed in 1999, it was assumed that the cancer risks due to this chemical were the same as found in 1991, 1994. This is considered a conservative assumption because there is evidence that concentrations of this chemical have been decreasing. As reported in E&E (1999), 1,4-dichlorobenzene concentrations in the well with the highest levels (1-GW-3) ranged from 25 to 31 :g/L in 1991 and 21 to 28 :g/L in 1994. EA (1997) reported a concentration of 17 :g/L 1,4-dichlorobenzene in 1-GW-3 in 1997. Although no sample was taken in 1999 for 1,4-dichlorobenzene, the above evidence indicates that there is a downward trend in concentrations, and that assuming the same concentrations found in 1991, 1994 (E&E 1999) is a conservative assumption.

As noted in Section 2.1, beryllium was not found to be more than 20 percent different in 1999; therefore, new cancer risks for beryllium were not calculated. However, the U.S. EPA has recently found that beryllium is carcinogenic only when inhaled (U.S. EPA IRIS 1999). Consequently, beryllium ingestion and dermal cancer risks calculated by E&E of $1.6 \text{ H} 10^{-5}$ and $7.1 \text{ H} 10^{-6}$ for adults and children, respectively, are not appropriate. Thus, carcinogenic risk for both receptor groups fall within the acceptable range of $1 \text{ H} 10^{-4}$ to $1 \text{ H} 10^{-6}$, established by the EPA (U.S. EPA 1990).

The hazard index for OBL future adult residents is 9.1 (Table 2-3) and for future child residents is 18 (Table 2-4). Noncancer hazard indices are driven primarily by manganese. As with beryllium, iron noncancer risks did not change by more than 20 percent; therefore, risks are assumed to be the same as determined from the 1991, 1994 data (2.3 and 5.3 for adults and children, respectively). Adding iron risks into the manganese risks identified earlier results in a new total risk of 11.4 and 23.3 for adults and children. There is evidence that concentrations of iron and manganese have decreased from 1991/1994 to 1999 (Table 2-2).

2.2.2.2 Risks at the Fire Training Area

Under RME assumptions, the estimated potential excess lifetime cancer risk associated with future adult residents is 7.3×10^{-5} for chemicals identified as risk drivers in the E&E report (Table 2-5). For future child residents, the estimated cancer risk is 3.2×10^{-5} (Table 2-6). The carcinogenic risk for both receptor groups fall within the acceptable range of 1×10^{-4} to 1×10^{-6} , established by the EPA (U.S. EPA 1990). Cancer risks found in 1999 are smaller than those found in 1991/1994 (Tables 2-5 and 2-6), primarily due to a decrease in PAH concentrations at the FTA.

The hazard index for future adult residents is 9.3 and for future child residents is 21.8. These hazard indices are driven primarily by iron and manganese (Tables 2-5 and 2-6). As in the OBL, there is some evidence that iron and manganese concentrations have decreased slightly since 1994.

**TABLE 2-1 SIGNIFICANT RISK-DRIVERS
FROM THE 1991, 1994 DATA ^(a)**

Chemical	Old Base Landfill (OBL)	Fire Training Area (FTA)
Volatiles		
1,2 Dichloroethene	X	
1,2 Dichloropropane	X	
1,4 Dichlorobenzene	X	
Chlorobenzene	X	
Chloroform	X	
Methylene Chloride	X	
1,1,2,2 Tetrachloroethane		X
Trichloroethene	X	
Vinyl chloride	X	
Metals		
Arsenic	X	X
Beryllium	X	X
Iron	X	X
Manganese	X	X
PAHs		
Benzo(a)anthracene		X
Benzo(a)pyrene		X
Benzo(k)fluoranthene		X
Chrysene		X
Indeno(1,2,3,c-d)pyrene		X

(a) Significant risk drivers Section 5.5.3 from E&E (1999).

**TABLE 2-2 COMPARISON OF RISK-DRIVER GROUND
WATER CONCENTRATIONS (1991, 1994) WITH 1999 DATA**

Chemical	Old Maximum mg/L ^(a)	New Maximum mg/L	New max. within 20% of old max.?	COPC?
Old Base Landfill (OBL)				
Metals				
Arsenic	0.0023	0.0021	Yes	No
Beryllium	0.0003	0.0001 ^(b)	No	Yes
Iron	37	33	Yes	No
Manganese	7	5	No	Yes
Volatiles				
1,2 Dichloroethene	0.12	0.017	No	Yes
1,2 Dichloropropane	0.001	0.0003 ^(b)	No	Yes
Chlorobenzene	0.355	0.17	No	Yes
Chloroform	0.004	0.0003 ^(b)	No	Yes
Methylene Chloride	0.097	0.0003 ^(b)	No	Yes
Trichloroethene	0.024	0.002	No	Yes
Vinyl chloride	0.0028	0.002	No	Yes
Semivolatiles				
1,4 dichlorobenzene	0.0031	NM	NA	NA
Fire Training Area (FTA)				
Metals				
Arsenic	0.0021	0.0029	No	Yes
Beryllium	0.0063	0.0001 ^(b)	No	Yes
Iron	79	39	No	Yes
Manganese	6	4	No	Yes
PAHs				
Benzo(a)anthracene	0.001	0.0001 ^(b)	No	Yes
Benzo(a)pyrene	0.002	1E-05 ^(b)	No	Yes
Benzo(k)fluoranthene	0.003	0.0001 ^(b)	No	Yes
Chrysene	0.002	0.0001 ^(b)	No	Yes
Indeno(1,2,3,c-d)pyrene	0.002	0.0001 ^(b)	No	Yes
Volatiles				
1,1,2,2 Tetrachloroethane	0.008	0.003	No	Yes

(a) The maximums from Table 5-3 of Final Remedial Investigation Report (E&E 1999)

(b) The maximum concentration was a non-detect, the concentration listed is 1/2 the detection limit

NM Not measured

NA Not Applicable

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TABLE 2-3 COMPARISON OF CANCER RISKS AND NON CANCER HAZARD QUOTIENTS FOR FUTURE RESIDENT ADULTS AT OBL(a)

Chemical	1991, 1994 Cancer Risks	1999 Cancer Risks	1991, 1994 Hazard Quotient	1999 Hazard Quotient
Beryllium	1.6E-05	5.0E-08	0.002	0.000005
1,2 Dichloroethene	NA	NA	0.04 (b)	0.053
1,2 Dichloropropane	8.7E-07	2.0E-07	0.04	0.009
1,4 Dichlorobenzene	4.7E-07	4.7E-7 (c)	NA	NA
Chlorobenzene	NA	NA	0.9 (b)	1.5
Chloroform	6.2E-06	3.5E-07	0.03	0.002
Manganese	NA	NA	9.8	7.5
Methylene Chloride	7.8E-07	2.9E-08	0.003	0.0001
Trichloroethene	1.7E-06	5.5E-06	NA	NA
Vinyl chloride	2E-5 (b)	5.6E-05	NA	NA
TOTAL	4.6E-05	1.2E-04	10.8	9.1

NA Not Applicable

(a) Iron and beryllium were not changed by more than 20 %, therefore not shown.

(b) Maximum 1991, 1994 concentrations greater than 1999 maximum concentrations. 1991, 1994 risks based on 95%UCLM of 0.014, 0.09, and 0.00066 mg/L for 1,2-dichloroethene, chlorobenzene, and vinyl chloride respectively.

(c) Assumed to be the same as 1991,1994 risks, not measured in 1999.

TABLE 2-4 COMPARISON OF CANCER RISKS AND NONCANCER HAZARD QUOTIENTS FOR FUTURE RESIDENT CHILDREN AT OBL (a)

Chemical	1991, 1994 Cancer Risks	1999 Cancer Risks	1991, 1994 Hazard Quotient	1999 Hazard Quotient
Beryllium	7.0E-06	2.9E-08	0.004	1.6E-05
1,2 Dichloroethene	NA	NA	0.1 (b)	0.13
1,2 Dichloropropane	4.0E-07	1.0E-07	NA	NA
1,4 Dichlorobenzene	1.9E-06	1.9E-06 (c)	NA	NA
Chlorobenzene	NA	NA	0.43 (b)	0.85
Chloroform	1.4E-07	1.6E-08	0.03	0.003
Manganese	NA	NA	23	17
Methylene Chloride	2.6E-07	1.1E-08	0.007	2.7E-04
Trichloroethene	4.3E-07	3.5E-06	NA	NA
Vinyl chloride	7.1E-06 (b)	2.2E-05	NA	NA
TOTAL	1.0E-05	2.8E-05	23.0	18.0

NA Not Applicable

(a) Iron and beryllium were not changed by more than 20 %, therefore not shown

(b) Maximum 1991, 1994 concentrations greater than 1999 maximum concentrations. 1991, 1994 risks based on 95% UCLM of 0.014, 0.09, and 0.00066 mg/L for 1,2-dichloroethene, chlorobenzene, and vinyl chloride respectively.

(c) Assumed to be the same as 1991, 1994 risks, not measured in 1999

TABLE 2-5 COMPARISON OF CANCER RISKS AND NONCANCER HAZARD QUOTIENTS FOR FUTURE RESIDENT ADULTS AT FTA

Chemical	1991, 1994 Cancer Risks	1999 Cancer Risks	1991, 1994 Hazard Quotient	1999 Hazard Quotient
Arsenic	2.0E-05	5.1E-05	0.1	0.3
Beryllium	2.0E-04	5.1E-06	0.02	0.0006
Iron	NA	NA	7.4	3.7
Manganese	NA	NA	7.7	5.3
Benz(a)anthracene	8.9E-06	8.8E-07	NA	NA
Benzo(a)pyrene	1.7E-04	8.7E-06	NA	NA
Benzo(k)fluoranthene	2.9E-05	1.3E-06	NA	NA
Chrysene	1.1E-06	5.0E-08	NA	NA
Indeno(1,2,3,c-d)pyrene	1.7E-05	8.6E-07	NA	NA
1,1,2,2 Tetrachloroethane	2.6E-05	1.3E-05	NA	NA
TOTAL	4.7E-04	7.3E-05	15.3	9.3

NA Not Applicable

TABLE 2-6 COMPARISON OF CANCER RISKS AND NONCANCER HAZARD QUOTIENTS FOR FUTURE RESIDENT CHILDREN AT FTA

Chemical	1991, 1994 Cancer Risks	1999 Cancer Risks	1991, 1994 Hazard Quotients	1999 Hazard Quotient
Arsenic	9.3E-06	2.4E-05	0.24	0.62
Beryllium	8.5E-05	2.4E-06	0.05	0.0013
Iron	NA	NA	17	8.6
Manganese	NA	NA	18	12.6
Benzo(a)anthracene	4.0E-06	4.0E-07	NA	NA
Benzo(a)pyrene	8.0E-05	4.0E-06	NA	NA
Benzo(k)fluoranthene	8.0E-07	4.0E-08	NA	NA
Chrysene	8.0E-08	4.0E-09	NA	NA
Indeno(1,2,3,c-d)pyrene	8.0E-06	4.0E-07	NA	NA
1,1,2,2 Tetrachloroethane	6.2E-06	3.3E-06	NA	NA
TOTAL	1.9E-04	3.2E-05	35.3	21.8

NA Not Applicable

3. ECOLOGICAL RISK SCREENING

A comparative ecological risk screening was conducted at the OBL and FTA at the NTC. Risk screening based on chemical concentrations from 1999 media samples was compared to risk screening conducted by the U.S. Fish & Wildlife Service (USFWS 1998) based upon media samples collected by E&E (1999) as part of a two-phase RI in 1991 and 1994. As a result of the RI, Interim Remedial Actions were performed in 1994-1995 to remove sources of contamination. The USFWS (1998) *Desktop Ecological Risk Assessment* included samples only from areas not remediated in 1994-1995. The focus of the USFWS study was on depositional areas, i.e., stream channels and wetland swales. The USFWS (1998) study concluded that a number of organic and inorganic constituents in sediment posed potential ecological risk at the OBL, and that several metals posed potential risk at the FTA.

The purpose of the current study was to re-investigate ecological risk at the OBL and FTA based on new samples collected in Spring 1999. The current study will permit a judgement as to whether prior remedial actions have had an ameliorating effect on perceived risk from sediment at the OBL and FTA.

The characterization of risk from the 1999 samples is based on an assumption of a linear relationship between chemical concentration and risk, i.e., hazard quotients (HQ). The screening of sediment and water risks to benthos used the same benchmark screening values used by the USFWS (1998) *Desktop Ecological Risk Assessment*. To assess current food-web risk to birds and mammals, the actual spreadsheet food-web model provided by USFWS was employed. Consequently, the procedures used in the current assessment were identical to those of the USFWS report, and the only difference was the use of new (1999) chemical concentrations.

The current assessment was restricted to those chemicals that were identified by USFWS (1998) as significant risk drivers, i.e., those that posed “some potential for risk.” Based upon a review of the USFWS report, the risk drivers were summarized in Table 3-1 by site and receptor. The OBL produced many more risk drivers than the FTA. At the former, a mix of PAH, pesticide, and metals were involved via several pathways including direct contact of benthos with sediment and surface water, and the food-web pathway to piscivorous birds and omnivorous mammals. A relative few metals were identified as potential risk drivers only in the food-web pathway at the FTA.

Of potential direct contact exposure pathways, USFWS (1998) considered only certain analytes in sediment and surface water to represent potential risk to benthos at the OBL Site only. The historical and current data are displayed in Tables 3-2 and 3-3. Of 26 sediment analytes screened (Table 3-2), the HQs for 24 were greater than 20 percent lower in the 1999 samples. Two analytes (chromium and zinc) were slightly lower in 1999, but not by greater than 20 percent. The surface water results were similar (Table 3-3). The 1999 HQs for 14 of 15 analytes in surface water were greater than 20 percent lower than the historical data. The 1999 screening for the sediment/surface water direct exposure to benthos pathway reflects a clear reduction in risk relative to the 1991/1994 data.

Food-web risks at the OBL Site decreased in 1999 for 27 of 35 analytes for the belted kingfisher and raccoon combined (Tables 3-4 and 3-5). Only the HQs for aluminum, copper, mercury, and zinc (kingfisher) and aluminum, chromium, copper, and mercury (raccoon) increased in 1999 by more than 20 percent, relative to 1991/1994. Of the eight analyte/receptor pairs considered to represent food-web risks at the FTA (Table 3-6), five HQs decreased by greater than 20 percent in 1999, and one (aluminum/raccoon) increased. Aluminum/kingfisher and chromium/raccoon did not change by greater than 20 percent.

Considering the benthic sediment and surface water screens, and food-web screens together, there was a total of 84 individual receptor/analyte pairs examined. Of these, 69 (82 percent) exhibited a greater than 20 percent decrease in risk (i.e., HQ) in 1999, relative to 1991/1994 data. Ten HQs (12 percent) increased, and five (6 percent) did not change. These results support a conclusion that there has been a marked reduction in the potential for ecological risk from sediment at the OBL and FTA.

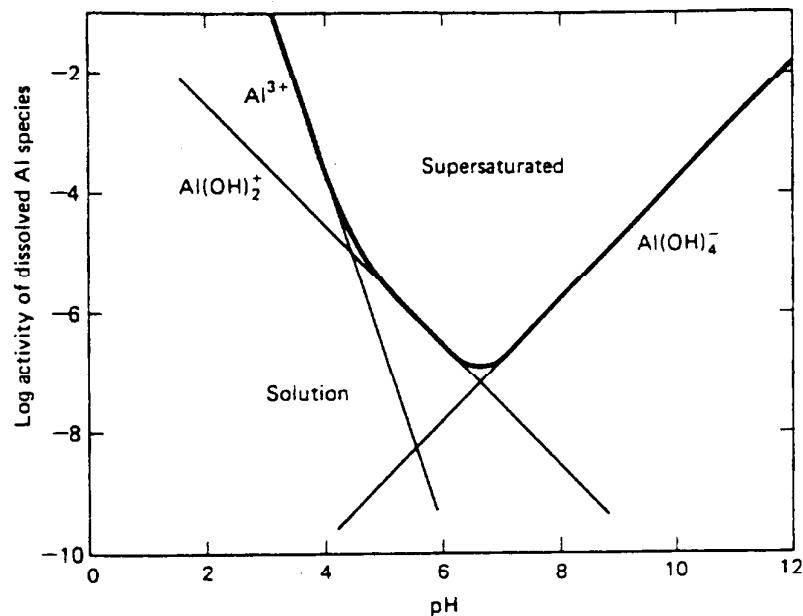
Aluminum had been previously identified as an important chemical of concern at both the OBL and FTA. Aluminum is the most common metallic element found on earth (only surpassed by nitrogen and oxygen), and constitutes approximately 8 percent of the earth's crust (Bodek et al. 1988). Characterization of the environmental fate, transport, and bioavailability of aluminum is complex due to its strong dependence upon the pH of the environment.

Aluminum has been shown to be toxic to both plants and aquatic organisms when present at high concentrations. Toxicity tests generally show that when pH is below 5.0, toxicity increases significantly, regardless of the test organism. The aluminum water quality criterion of 87 :g/L (chronic) and 750 :g/L (acute) (U.S. EPA 1988) apply to pH ranges found in most ambient water waters of 6.5 to 9.0. Outside of this range, few, if any toxicity tests have been conducted.

As noted earlier, the proportion of soluble, and thus bioavailable, aluminum is strongly dependent upon the pH of the water surrounding the soil or sediment particle, or the water column itself. Figure 3-1 shows the solubility dependence of aluminum as a function of pH. The lower the Molar activity, the smaller the soluble proportion of aluminum, and as can be seen in Figure 3-1, Molar activity is minimized between a pH ranges of 5.0 and 8.5. It is not serendipitous that this pH range is similar to that found for water quality criteria. Below or above this pH, Molar activity increases, thereby increasing the soluble proportion of aluminum and its consequent bioavailability.

The pH of sediment samples collected at Bainbridge range from 6.2 to 7.6, with the majority above 7.2 (Table 3-7). These pH values are all within the range of minimized Molar activity, therefore minimized solubility (Figure 3-1).

Sediment pH values found for Bainbridge are within the range of minimized aluminum solubility. It is not expected that aluminum concentrations found in sediment at the site represent a potential risk to benthic organisms.



Note: Heavy line is sum of individual activities.

Figure 3-1. Solubility diagram of the most significant species of aluminum in aqueous solution as function of pH. (From Bodek et al. 1988)

TABLE 3-1. POTENTIAL ECOLOGICAL RISK DRIVERS AT THE OLD LANDFILL SITE AND FIRE TRAINING AREA

Old Landfill				Fire Training Area	
Benthos	Benthos	Piscivorous Birds Kingfisher	Omnivorous Mammals Raccoon	Piscivorous Birds Kingfisher	Omnivorous Mammals Raccoon
2-methylnaphthalene	4,4'-DDD	Benzo(a)anthracene	Acenaphthylene	Aluminum	Aluminum
Acenaphthene	4,4'-DDE	Benzo(a)pyrene	Anthracene	Copper	Chromium (total)
Acenaphthylene	4,4'-DDT	Benzo(b)fluoranthene	Benzo(a)anthracene	Lead	Copper
Anthracene	Methoxychlor	Benzo(g,h,i)perylene	Benzo(a)pyrene		Lead
Fluorene	alpha-Chlordane	Chrysene	Benzo(b)fluoranthene		Manganese
Naphthalene	gamma-Chlordane	Fluoranthene	Benzo(g,h,i)perylene		
Phenanthrene	Aluminum	Phenanthrene	Benzo(k)fluoranthene		
Benzo(a)anthracene	Antimony	Pyrene	Chrysene		
Benzo(a)pyrene	Beryllium	alpha-chlordane	Fluoranthene		
Benzo(b)fluoranthene	Cadmium	gamma-chlordane	Fluorene		
Benzo(g,h,i)perylene	Chromium (total)	Aluminum	Indeno(1,2,3-cd)pyrene		
Chrysene	Copper	Cadmium	Phenanthrene		
Dibenz(a,h)anthracene	Iron	Copper	Pyrene		
Fluoranthene	Lead	Lead	Aluminum		
Indeno(1,2,3-c,d)pyrene	Manganese	Mercury	Chromium, total		
Pyrene	Mercury	Zinc	Copper		
	Nickel		Lead		
	Selenium		Manganese		
	Zinc		Mercury		

Based on USFWS (1998)

TABLE 3-2. COMPARATIVE SCREENING OF RISK TO BENTHOS FROM SEDIMENT AT OLD LANDFILL SITE

FWS Risk Drivers	Risk Screen Based on 1991/1994 Data				Risk Screen Based on 1999 Data			99HQ/ 91-94HQ	> 20% Change	Direction of Change
	Maximum Concentration	Detection Frequency	Benchmark Concentration	HQ	Maximum Concentration	Detection Frequency	HQ			
2-methylnaphthalene	500	0.11	70	7.1	16	0.83	0.2	0.03	Yes	Decrease
Acenaphthene	180	0.21	16	11.3	55	1.00	3.4	0.31	Yes	Decrease
Acenaphthylene	15000	0.11	44	340.9	15	0.83	0.3	0.001	Yes	Decrease
Anthracene	27000	0.46	85.3	316.5	140	1.00	1.6	0.01	Yes	Decrease
Fluorene	13000	0.29	19	684.2	72	1.00	3.8	0.01	Yes	Decrease
Naphthalene	1700	0.14	160	10.6	20	0.83	0.1	0.01	Yes	Decrease
Phenanthrene	120000	0.86	240	500.0	640	1.00	2.7	0.01	Yes	Decrease
Benzo(a)anthracene	47000	0.79	261	180.1	490	1.00	1.9	0.01	Yes	Decrease
Benzo(a)pyrene	54000	0.79	430	125.6	670	1.00	1.6	0.01	Yes	Decrease
Benzo(b)fluoranthene	74000	0.93	3200	23.1	730	1.00	0.2	0.01	Yes	Decrease
Benzo(g,h,i)perylene	36000	0.64	670	53.7	420	1.00	0.6	0.01	Yes	Decrease
Chrysene	55000	0.82	384	143.2	370	1.00	1.0	0.01	Yes	Decrease
Dibenz(a,h)anthracene	9100	0.32	63.4	143.5	68	1.00	1.1	0.01	Yes	Decrease
Fluoranthene	120000	0.96	600	200.0	760	1.00	1.3	0.01	Yes	Decrease
Indeno(1,2,3-c,d)pyrene	38000	0.75	600	63.3	440	1.00	0.7	0.01	Yes	Decrease
Pyrene	89000	0.96	665	133.8	1300	1.00	2.0	0.01	Yes	Decrease
4,4'-DDD	220	0.79	16	13.8	150	0.57	9.4	0.68	Yes	Decrease
4,4'-DDE	200	0.86	2.2	90.9	140	0.57	63.6	0.70	Yes	Decrease
4,4'-DDT	440	0.82	1.58	278.5	54	0.14	34.2	0.12	Yes	Decrease
alpha-Chlordane	280	0.32	0.5	560.0	66	0.29	132.0	0.24	Yes	Decrease
gamma-Chlordane	410	0.25	0.5	820.0	62	0.29	124.0	0.15	Yes	Decrease
Chromium (total)	49.4	1.00	5.0	9.9	49	1.00	9.8	0.99	No	
Lead	387	1.00	46.7	8.3	110	1.00	2.4	0.28	Yes	Decrease
Mercury	0.19	0.14	0.15	1.3	0.13	1.00	0.9	0.68	Yes	Decrease
Nickel	57.1	1.00	20.9	2.7	217	1.00	10.4	3.80	Yes	Increase
Zinc	186	1.00	150	1.2	153	1.00	1.0	0.82	No	

Note: Concentrations are ug/kg for organics and mg/kg for metals. 1991/1994 total samples=28. 1999 total samples= 6.

TABLE 3-3. COMPARATIVE SCREENING OF RISK TO BENTHOS FROM SURFACE WATER AT OLD LANDFILL SITE

FWS Risk Drivers	Risk Screen Based on 1991/1994 Data				Risk Screen Based on 1999 Data			99HQ/ 91-94HQ	> 20% Change	Direction of Change
	Maximum Concentration	Detection Frequency	Benchmark Concentration	HQ	Maximum Concentration	Detection Frequency	HQ			
4,4'-DDD	0.81	0.03	0.6	1.4	0.05	0.00	0.08	0.06	Yes	Decrease
Methoxychlor	0.31	0.03	0.03	10.3	0.3	0.00	10.00	0.97	No	
Aluminum	399000	0.93	25.0	15960.0	10.5	0.00	0.42	0.00003	Yes	Decrease
Antimony	58.7	0.03	30.0	2.0	0.9	0.00	0.03	0.02	Yes	Decrease
Beryllium	40.5	0.31	5.3	7.6	0.11	0.00	0.02	0.003	Yes	Decrease
Cadmium	25.4	0.07	0.5	47.9	0.13	0.00	0.25	0.01	Yes	Decrease
Chromium, total	532	0.34	120.0	4.4	1.1	0.80	0.01	0.002	Yes	Decrease
Copper	950	0.41	6.5	146.2	5	1.00	0.77	0.01	Yes	Decrease
Iron	833000	1.00	320.0	2603.1	8370	0.40	26.16	0.01	Yes	Decrease
Lead	1360	0.79	3.2	425.0	3.9	1.00	1.22	0.003	Yes	Decrease
Manganese	15600	1.00	14500	1.1	2460	1.00	0.17	0.16	Yes	Decrease
Mercury	0.81	0.17	0.012	67.5	0.02	0.20	1.67	0.02	Yes	Decrease
Nickel	614	0.34	160	3.8	29.9	0.60	0.19	0.05	Yes	Decrease
Selenium	22.4	0.07	5	4.5	5.9	0.40	1.18	0.26	Yes	Decrease
Zinc	2980	0.86	110	27.1	67.2	1.00	0.61	0.02	Yes	Decrease

Note: Concentrations are ug/L. Metal concentrations are dissolved fraction. 991/1994 total samples=29. 1999 total samples= 5.

TABLE 3-4. COMPARATIVE SCREENING OF FOOD-WEB RISK TO KINGFISHER AT OLD LANDFILL SITE

Food-Web Results Using 1991/1994 Concentration Data														
FWS Risk Drivers	Maximum Conc. (mg/kg)	BAF	Conc. in Fish (mg/kg)	Conc. from Sediment (mg/kg)	Ingestion Rate (kg/day)	Water Conc. (mg/kg)	Water Ingestion (kg/day)	AUF	Body Weight (1/kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	LOAEL HQ	NOAEL (mg/kg/day)	NOAEL HQ
Benzo(a)anthracene	24	1	23.5	0.04	0.06	0.000	0.012	1	8.85	12.5	100	0.1	10	1.2
Benzo(a)pyrene	27	1	27.0	0.05	0.06	0.000	0.012	1	8.85	14.3	100	0.1	10	1.4
Benzo(b)fluoranthene	37	1	36.9	0.1	0.06	0.000	0.012	1	8.85	19.6	100	0.2	10	2.0
Benzo(g,h,i)perylene	18	1	18.0	0.03	0.06	0.000	0.012	1	8.85	9.6	100	0.1	10	1.0
Chrysene	27.5	1	27.5	0.05	0.06	0.003	0.012	1	8.85	14.6	100	0.1	10	1.5
Fluoranthene	60	1	59.9	0.1	0.06	0.008	0.012	1	8.85	31.9	100	0.3	10	3.2
Phenanthrene	60	1	59.9	0.1	0.06	0.010	0.012	1	8.85	31.9	100	0.3	10	3.2
Pyrene	44.5	1	44.4	0.1	0.06	0.005	0.012	1	8.85	23.6	100	0.2	10	2.4
alpha-chlordane	0.14	1	0.1	0.0002	0.06	0.000	0.012	1	8.85	0.1	0.19	0.4	0.019	3.9
gamma-chlordane	0.205	1	0.2	0.0003	0.06	0.000	0.025	1	8.85	0.1	0.19	0.6	0.019	5.7
Aluminum	4840	1	4831.8	8.2	0.06	399	0.012	1	8.85	2612	165	16	84	31
Cadmium	1.6	1	1.5	0.003	0.06	0.025	0.012	1	8.85	0.8	3.31	0.2	0.33	2.5
Copper	26.2	1	26.1	0.04	0.06	0.749	0.012	1	8.85	14.0	2.35	5.9	0.235	59
Lead	193.5	1	193	0.3	0.06	1.8	0.012	1	8.85	103	3.0	34	0.3	343
Mercury	0.095	1	0.1	0.0002	0.06	0.0008	0.012	1	8.85	0.05	0.12	0.42	0.012	4.2
Zinc	93	1	92.8	0.2	0.06	2.98	0.012	1	8.85	50	139	0.4	13.9	3.6

TABLE 3-4 (Continued)

Food-Web Results Using 1999 Concentration Data														
FWS Risk Drivers	Maximum Conc. (mg/kg)	BAF	Conc. in Fish (mg/kg)	Conc. from Sediment (mg/kg)	Ingestion Rate (kg/day)	Water Conc. (mg/kg)	Water Ingestion (kg/day)	AUF	Body Weight (1/kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	LOAEL HQ	NOAEL (mg/kg/day)	NOAEL HQ
Benzo(a)anthracene	0.49	1	0.5	0.0008	0.06	0.00015	0.012	1	8.85	0.3	100	0.0	10	0.0
Benzo(a)pyrene	0.67	1	0.7	0.0011	0.06	0.00015	0.012	1	8.85	0.4	100	0.0	10	0.0
Benzo(b)fluoranthene	0.73	1	0.7	0.0012	0.06	0.00015	0.012	1	8.85	0.4	100	0.0	10	0.0
Benzo(g,h,i)perylene	0.42	1	0.4	0.0007	0.06	0.00015	0.012	1	8.85	0.2	100	0.0	10	0.0
Chrysene	0.37	1	0.4	0.0006	0.06	0.00015	0.012	1	8.85	0.2	100	0.0	10	0.0
Fluoranthene	0.76	1	0.8	0.0013	0.06	0.00015	0.012	1	8.85	0.4	100	0.0	10	0.0
Phenanthrene	0.64	1	0.6	0.0011	0.06	0.00015	0.012	1	8.85	0.3	100	0.0	10	0.0
Pyrene	1.3	1	1.3	0.0022	0.06	0.00015	0.012	1	8.85	0.7	100	0.0	10	0.1
alpha-chlordane	0.066	1	0.1	0.0001	0.06	0.00003	0.012	1	8.85	0.0	0.19	0.2	0.019	1.8
gamma-chlordane	0.062	1	0.1	0.0001	0.06	0.00003	0.025	1	8.85	0.0	0.19	0.2	0.019	1.7
Aluminum	15400	1	15373.8	26.2	0.06	0.28400	0.012	1	8.85	8177	165	50	84	97
Cadmium	0.4	1	0.4	0.0007	0.06	0.00013	0.012	1	8.85	0.2	3.31	0.1	0.33	0.7
Copper	52.2	1	52.1	0.089	0.06	0.00450	0.012	1	8.85	27.7	2.35	11.8	0.235	118
Lead	110	1	110	0.19	0.06	0.00200	0.012	1	8.85	58	3.0	19	0.3	195
Mercury	0.13	1	0.1	0.0002	0.06	0.00003	0.012	1	8.85	0.07	0.12	0.58	0.012	5.8
Zinc	153	1	152.7	0.26	0.06	0.09690	0.012	1	8.85	81	139	0.6	13.9	5.8

TABLE 3-4 (Continued)

FWS Risk Drivers	COMPARISON OF 1991/1994 AND 1999 FOOD-WEB SCREENING RESULTS									
	LOAEL DATA COMPARISON					NOAEL DATA COMPARISON				
	1991/1994 LOAEL HQ	1999 LOAEL HQ	1999HQ/ 91-94HQ	>20% Change	Direction of Change	1991/1994 NOAEL HQ	1999 NOAEL HQ	1999HQ/ 91-94HQ	>20% Change	Direction of Change
Benzo(a)anthracene	0.1	0.003	0.02	Yes	Decrease	1.2	0.026	0.02	Yes	Decrease
Benzo(a)pyrene	0.1	0.004	0.02	Yes	Decrease	1.4	0.036	0.02	Yes	Decrease
Benzo(b)fluoranthene	0.2	0.004	0.02	Yes	Decrease	2.0	0.039	0.02	Yes	Decrease
Benzo(g,h,i)perylene	0.1	0.002	0.02	Yes	Decrease	1.0	0.022	0.02	Yes	Decrease
Chrysene	0.1	0.002	0.01	Yes	Decrease	1.5	0.020	0.01	Yes	Decrease
Fluoranthene	0.3	0.004	0.01	Yes	Decrease	3.2	0.040	0.01	Yes	Decrease
Phenanthrene	0.3	0.003	0.01	Yes	Decrease	3.2	0.034	0.01	Yes	Decrease
Pyrene	0.2	0.007	0.03	Yes	Decrease	2.4	0.069	0.03	Yes	Decrease
alpha-chlordane	0.4	0.184	0.47	Yes	Decrease	3.9	1.8	0.47	Yes	Decrease
gamma-chlordane	0.6	0.173	0.30	Yes	Decrease	5.7	1.7	0.30	Yes	Decrease
Aluminum	15.8	50	3.13	Yes	Increase	31.1	97.4	3.13	Yes	Increase
Cadmium	0.2	0.07	0.28	Yes	Decrease	2.5	0.71	0.28	Yes	Decrease
Copper	5.9	11.8	1.98	Yes	Increase	59.4	118.0	1.98	Yes	Increase
Lead	34.3	19	0.57	Yes	Decrease	343.1	194.7	0.57	Yes	Decrease
Mercury	0.4	0.58	1.37	Yes	Increase	4.2	5.8	1.37	Yes	Increase
Zinc	0.4	0.6	1.63	Yes	Increase	3.6	5.8	1.63	Yes	Increase

Note: 1991/1994 concentration data and food-web model procedures from USFWS (1998). Water concentrations of metals are total fraction.

TABLE 3-5. COMPARATIVE SCREENING OF FOOD-WEB RISK TO RACCOON AT OLD LANDFILL SITE

Food-Web Results Using 1991/1994 Concentration Data														
FWS Risk Drivers	Maximum Conc. (mg/kg)	BAF	Conc. in Fish (mg/kg)	Conc. from Sediment (mg/kg)	Ingestion Rate (kg/day)	Water Conc. (mg/kg)	Water Ingestion (kg/day)	AUF	Body Weight (1/kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	LOAEL HQ	NOAEL (mg/kg/day)	NOAEL HQ
Acenaphthylene	7.5	1	7	0.7	0.5	0.000	0.025	1	0.5	1.9	2.6	0.7	1.3	1.4
Anthracene	13.5	1	12	1.3	0.5	0.000	0.025	1	0.5	3.4	2.6	1.3	1.3	2.6
Benzo(a)anthracene	23.5	1	21	2.2	0.5	0.000	0.025	1	0.5	5.9	2.6	2.3	1.3	4.5
Benzo(a)pyrene	27	1	24	2.5	0.5	0.000	0.025	1	0.5	6.8	2.6	2.6	1.3	5.2
Benzo(b)fluoranthene	37	1	34	3.5	0.5	0.000	0.025	1	0.5	9.3	2.6	3.6	1.3	7.1
Benzo(g,h,i)perylene	18	1	16	1.7	0.5	0.000	0.025	1	0.5	4.5	2.6	1.7	1.3	3.5
Benzo(k)fluoranthene	17.5	1	16	1.6	0.5	0.000	0.025	1	0.5	4.4	2.6	1.7	1.3	3.4
Chrysene	27.5	1	25	2.6	0.5	0.003	0.025	1	0.5	6.9	2.6	2.6	1.3	5.3
Fluoranthene	60	1	54	5.6	0.5	0.008	0.025	1	0.5	15.0	2.6	5.8	1.3	12
Fluorene	6.5	1	6	0.6	0.5	0.003	0.025	1	0.5	1.6	2.6	0.6	1.3	1.3
Indeno(1,2,3-cd)pyrene	19	1	17	1.8	0.5	0.000	0.025	1	0.5	4.8	2.6	1.8	1.3	3.7
Phenanthrene	60	1	54	5.6	0.5	0.010	0.025	1	0.5	15.0	2.6	5.8	1.3	12
Pyrene	44.5	1	40	4.2	0.5	0.005	0.025	1	0.5	11.1	2.6	4.3	1.3	8.6
Aluminum	4840	1	4385	455	0.5	399	0.025	1	0.5	1215.0	55	22	5.5	221
Chromium, total	24.7	1	22	2.3	0.5	0.532	0.025	1	0.5	6.2	1.7	3.6	0.17	36
Copper	26.2	1	24	2.5	0.5	0.749	0.025	1	0.5	6.5	10	0.7	1	6.5
Lead	193.5	1	175	18	0.5	1.8	0.025	1	0.5	48	1.5	32	0.15	323
Manganese	2800	1	2537	263	0.5	15.6	0.025	1	0.5	700	13	54	1.3	539
Mercury	0.095	1	0.09	0.009	0.5	0.0008	0.025	1	0.5	0.02	0.1	0.2	0.01	2.4

TABLE 3-5 (Continued)

Food-Web Results Using 1999 Concentration Data														
FWS Risk Drivers	Maximum Conc. (mg/kg)	BAF	Conc. in Fish (mg/kg)	Conc. from Sediment (mg/kg)	Ingestion Rate (kg/day)	Water Conc. (mg/kg)	Water Ingestion (kg/day)	AUF	Body Weight (1/kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	LOAEL HQ	NOAEL (mg/kg/day)	NOAEL HQ
Acenaphthylene	0.015	1	0.014	0.001	0.5	0.00015	0.025	1	0.5	0.004	2.6	0.001	1.3	0.0029
Anthracene	0.14	1	0.127	0.013	0.5	0.00015	0.025	1	0.5	0.035	2.6	0.01	1.3	0.03
Benzo(a)anthracene	0.49	1	0.444	0.046	0.5	0.00015	0.025	1	0.5	0.123	2.6	0.05	1.3	0.09
Benzo(a)pyrene	0.67	1	0.607	0.063	0.5	0.00015	0.025	1	0.5	0.168	2.6	0.06	1.3	0.13
Benzo(b)fluoranthene	0.73	1	0.661	0.069	0.5	0.00015	0.025	1	0.5	0.183	2.6	0.07	1.3	0.14
Benzo(g,h,i)perylene	0.42	1	0.381	0.039	0.5	0.00015	0.025	1	0.5	0.105	2.6	0.04	1.3	0.08
Benzo(k)fluoranthene	0.16	1	0.145	0.015	0.5	0.00015	0.025	1	0.5	0.040	2.6	0.02	1.3	0.03
Chrysene	0.37	1	0.335	0.035	0.5	0.00015	0.025	1	0.5	0.093	2.6	0.04	1.3	0.07
Fluoranthene	0.76	1	0.689	0.071	0.5	0.00015	0.025	1	0.5	0.190	2.6	0.07	1.3	0.15
Fluorene	0.072	1	0.065	0.007	0.5	0.00015	0.025	1	0.5	0.018	2.6	0.01	1.3	0.01
Indeno(1,2,3-cd)pyrene	0.44	1	0.399	0.041	0.5	0.00015	0.025	1	0.5	0.110	2.6	0.04	1.3	0.08
Phenanthrene	0.64	1	0.580	0.060	0.5	0.00015	0.025	1	0.5	0.160	2.6	0.06	1.3	0.12
Pyrene	1.3	1	1.178	0.122	0.5	0.00015	0.025	1	0.5	0.325	2.6	0.13	1.3	0.25
Aluminum	15400	1	13952	1448	0.5	399.00	0.025	1	0.5	3855.0	55	70	5.5	701
Chromium, total	49	1	44	4.6	0.5	0.0014	0.025	1	0.5	12.3	1.7	7.2	0.17	72
Copper	52.2	1	47	4.9	0.5	0.7490	0.025	1	0.5	13.1	10	1.3	1	13.1
Lead	110	1	100	10	0.5	1.7600	0.025	1	0.5	28	1.5	18	0.15	183
Manganese	608	1	551	57	0.5	2.3500	0.025	1	0.5	152	13	12	1.3	117
Mercury	0.13	1	0.118	0.012	0.5	0.0008	0.025	1	0.5	0.033	0.1	0.33	0.01	3.3

TABLE 3-5 (Continued)

FWS Risk Drivers	COMPARISON OF 1991/1994 AND 1999 FOOD-WEB SCREENING RESULTS									
	LOAEL DATA COMPARISON					NOAEL DATA COMPARISON				
	1991/1994 LOAEL HQ	1999 LOAEL HQ	1999HQ/ 91-94HQ	>20% Change	Direction of Change	1991/1994 NOAEL HQ	1999 NOAEL HQ	1999HQ/ 91-94HQ	>20% Change	Direction of Change
Acenaphthylene	0.7	0.001	0.00	Yes	Decrease	1.4	0.003	0.002	Yes	Decrease
Anthracene	1.3	0.01	0.01	Yes	Decrease	2.6	0.03	0.01	Yes	Decrease
Benzo(a)anthracene	2.3	0.05	0.02	Yes	Decrease	4.5	0.09	0.02	Yes	Decrease
Benzo(a)pyrene	2.6	0.1	0.02	Yes	Decrease	5.2	0.1	0.02	Yes	Decrease
Benzo(b)fluoranthene	3.6	0.1	0.02	Yes	Decrease	7.1	0.1	0.02	Yes	Decrease
Benzo(g,h,i)perylene	1.7	0.04	0.02	Yes	Decrease	3.5	0.08	0.02	Yes	Decrease
Benzo(k)fluoranthene	1.7	0.02	0.01	Yes	Decrease	3.4	0.03	0.01	Yes	Decrease
Chrysene	2.6	0.04	0.01	Yes	Decrease	5.3	0.07	0.01	Yes	Decrease
Fluoranthene	5.8	0.1	0.01	Yes	Decrease	11.5	0.1	0.01	Yes	Decrease
Fluorene	0.6	0.007	0.01	Yes	Decrease	1.3	0.01	0.01	Yes	Decrease
Indeno(1,2,3-cd)pyrene	1.8	0.04	0.02	Yes	Decrease	3.7	0.08	0.02	Yes	Decrease
Phenanthrene	5.8	0.1	0.01	Yes	Decrease	11.5	0.1	0.01	Yes	Decrease
Pyrene	4.3	0.1	0.03	Yes	Decrease	8.6	0.3	0.03	Yes	Decrease
Aluminum	22.1	70.1	3.17	Yes	Increase	220.9	701	3.17	Yes	Increase
Chromium, total	3.6	7.2	1.98	Yes	Increase	36.4	72	1.98	Yes	Increase
Copper	0.7	1.3	1.99	Yes	Increase	6.5	13	1.99	Yes	Increase
Lead	32.3	18.3	0.57	Yes	Decrease	323	183	0.57	Yes	Decrease
Manganese	53.9	11.7	0.22	Yes	Decrease	539	117	0.22	Yes	Decrease
Mercury	0.2	0.3	1.37	Yes	Increase	2.4	3	1.37	Yes	Increase

Note: 1991/1994 concentration data and food-web model procedures from USFWS (1998). Water concentrations of metals are total fraction.

TABLE 3-6. COMPARATIVE SCREENING OF FOOD-WEB RISK TO KINGFISHER AND RACCOON AT FIRE TRAINING AREA

Food-Web Results Using 1991/1994 Concentration Data: Kingfisher														
FWS Risk Drivers	Maximum Conc. (mg/kg)	BAF	Conc. in Fish (mg/kg)	Conc. from Sediment (mg/kg)	Ingestion Rate (kg/day)	Water Conc. (mg/kg)	Water Ingestion (kg/day)	AUF	Body Weight (1/kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	LOAEL HQ	NOAEL (mg/kg/day)	NOAEL HQ
Aluminum	1855	1	1851.8	3.15	0.06	33.2	0.012	1	8.85	989	165	6.0	84	12
Copper	4.4	1	4.4	0.01	0.06	0.435	0.012	1	8.85	2.4	2.35	1.0	0.235	10
Lead	17.8	1	17.7	0.03	0.06	0.498	0.012	1	8.85	9.5	3	3.2	0.3	32
Food-Web Results Using 1991/1994 Concentration Data: Raccoon														
Aluminum	1855	1	1680.63	174.4	0.5	33.2	0.025	1	0.5	464	55	8.4	5.5	84
Chromium (total)	4.55	1	4.12	0.4	0.5	0.081	0.025	1	0.5	1.1	1.7	0.7	0.17	6.7
Copper	4.4	1	3.99	0.4	0.5	0.435	0.025	1	0.5	1.1	10	0.1	1	1.1
Lead	17.8	1	16.13	1.7	0.5	0.498	0.025	1	0.5	4.5	1.5	3.0	0.15	30
Manganese	359.5	1	325.71	33.8	0.5	7.080	0.025	1	0.5	90	13	6.9	1.3	69
Food-Web Results Using 1999 Concentration Data: Kingfisher														
FWS Risk Drivers	Maximum Conc. (mg/kg)	BAF	Conc. in Fish (mg/kg)	Conc. from Sediment (mg/kg)	Ingestion Rate (kg/day)	Water Conc. (mg/kg)	Water Ingestion (kg/day)	AUF	Body Weight (1/kg)	Dose (mg/kg/day)	LOAEL (mg/kg/day)	LOAEL HQ	NOAEL (mg/kg/day)	NOAEL HQ
Aluminum	2230	1	2226.2	3.79	0.06	0.3	0.012	1	8.85	1184	165	7.2	84	14.1
Copper	2.1	1	2.1	0.004	0.06	0.004	0.012	1	8.85	1.1	2.35	0.5	0.235	4.7
Lead	5.0	1	5.0	0.009	0.06	0.002	0.012	1	8.85	2.7	3	0.9	0.3	8.9
Food-Web Results Using 1999 Concentration Data: Raccoon														
Aluminum	2230	1	2020.38	209.6	0.5	0.3	0.025	1	0.5	558	55	10.1	5.5	101.4
Chromium (total)	4.2	1	3.81	0.39	0.5	0.001	0.025	1	0.5	1.1	1.7	0.6	0.17	6.2
Copper	2.1	1	1.90	0.20	0.5	0.004	0.025	1	0.5	0.5	10	0.1	1	0.5
Lead	5	1	4.53	0.47	0.5	0.002	0.025	1	0.5	1.3	1.5	0.8	0.15	8.3
Manganese	176	1	159.46	16.5	0.5	0.155	0.025	1	0.5	44	13	3.4	1.3	33.8

TABLE 3-6 (Continued)

FWS Risk Drivers	COMPARISON OF 1991/1994 AND 1999 FOOD-WEB SCREENING RESULTS									
	LOAEL DATA COMPARISON					NOAEL DATA COMPARISON				
	1991/1994 LOAEL HQ	1999 LOAEL HQ	1999HQ/ 91-94HQ	>20% Change	Direction of Change	1991/1994 NOAEL HQ	1999 NOAEL HQ	1999HQ/ 91-94HQ	>20% Change	Direction of Change
Kingfisher										
Aluminum	6.0	7.2	1.20	No		12.0	14.1	1.17	No	
Copper	1.0	0.5	0.47	Yes	Decrease	10.0	4.7	0.47	Yes	Decrease
Lead	3.2	0.9	0.28	Yes	Decrease	32.0	8.9	0.28	Yes	Decrease
Raccoon										
Aluminum	8.4	10.1	1.20	No		84.0	101.4	1.21	Yes	Increase
Chromium (total)	0.7	0.6	0.92	No		6.7	6.2	0.92	No	
Copper	0.1	0.1	0.47	Yes	Decrease	1.1	0.5	0.48	Yes	Decrease
Lead	3.0	0.8	0.28	Yes	Decrease	30.0	8.3	0.28	Yes	Decrease
Manganese	6.9	3.4	0.49	Yes	Decrease	69.0	33.8	0.49	Yes	Decrease

Note: 1991/1994 concentration data and food-web model procedures from USFWS (1998). Water concentrations are total fraction.

TABLE 3-7 SUMMARY OF BAINBRIDGE SEDIMENT pH VALUES

Sample ID	Date Sampled	pH
P2-SD-8	4/13/99	7.2
1-SD-10	4/15/99	7.4
1-SD-11	4/14/99	6.2
1-SD-9	4/14/99	7.5
P1-SD-7	4/14/99	7.4
1-SD-18	4/14/99	7.5
1-SD-8	4/16/99	7.6
SD-DUP8	4/16/99	7.6

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APPENDIX A

SUMMARY OF RESULTS

**Table A-1 Analysis Data for Groundwater
 Samples at Site OBL**

Field Sample ID	1-GW-1	1-GW-10	1-GW-11	1-GW-12	1-GW-13
Lab Sample ID:	WP1916-4	WP1884-5	WP1884-1	WP1884-2	WP1884-3
Sample Date:	04/08/99	04/07/99	04/07/99	04/07/99	04/07/99

Analyte	Units	1-GW-1	1-GW-10	1-GW-11	1-GW-12	1-GW-13
Metals						
ALUMINUM	UG/L	10.76 U	10.76 U	103 B	120 B	136 B
ANTIMONY	UG/L	1.81 U				
ARSENIC	UG/L	2.07 U				
BARIUM	UG/L	77.4	49.2	42.2	69.2	77.1
BERYLLIUM	UG/L	0.21 U				
CADMIUM	UG/L	0.26 U				
CALCIUM	UG/L	27400	54500	25900	45000	46000
CHROMIUM	UG/L	0.72 J	0.67 J	0.59 U	2 J	0.99 J
COBALT	UG/L	0.82 B	0.64 U	2.1 B	0.64 U	0.64 U
COPPER	UG/L	6.5 J	0.55 U	0.55 U	0.55 U	0.55 U
IRON	UG/L	13.7 B	23.6 B	150 B	5040	246
LEAD	UG/L	2.3 J	1.09 U	1.4 J	1.09 U	1.09 U
MAGNESIUM	UG/L	9660	27500	12500	21100	18300
MANGANESE	UG/L	14.8	0.8 B	9.4	906	22.7
MERCURY	UG/L	0.02 U	0.04 B	0.02 UL	0.02 UL	0.02 UL
NICKEL	UG/L	1.3 J	0.9 J	0.85 U	1.2 J	0.85 U
POTASSIUM	UG/L	1890	2270	3330	5690	5790
SELENIUM	UG/L	3.8 B	2.57 U	3.9 B	3.4 B	2.57 U
SILVER	UG/L	1.2 B	0.69 U	0.69 U	0.72 B	0.69 U
SODIUM	UG/L	14100	24900	47900	30400	40900
THALLIUM	UG/L	4.49 U				
VANADIUM	UG/L	0.82 B	0.75 B	0.67 B	0.62 U	1.1 B
ZINC	UG/L	8.7 B	5.4 B	6.7 B	8 B	8.8 B
TPH						
GASOLINE RANGE ORGANICS	UG/L	10 U	11	10 U	10 U	12
TOTAL PETROLEUM HYDROCARBONS	UG/L	64	67	50 U	58	50 U
Pesticides/PCBs						
4,4'-DDD	UG/L	0.1 U				
4,4'-DDE	UG/L	0.1 U				
4,4'-DDT	UG/L	0.1 U				
ALDRIN	UG/L	0.05 U				
ALPHA BHC	UG/L	0.05 U				
ALPHA-CHLORDANE	UG/L	0.05 U				
AROCLOR 1016	UG/L	0.5 U				
AROCLOR 1221	UG/L	1 U	1 U	1 U	1 U	1 U
AROCLOR 1232	UG/L	0.5 U				

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
Samples at Site OBL**

Field Sample ID Lab Sample ID: Sample Date:	1-GW-1	1-GW-10	1-GW-11	1-GW-12	1-GW-13
	WP1916-4	WP1884-5	WP1884-1	WP1884-2	WP1884-3
	04/08/99	04/07/99	04/07/99	04/07/99	04/07/99
AROCLOR 1242	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1248	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1254	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1260	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
BETA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U
DELTA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	UG/L	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	UG/L	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN II	UG/L	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	UG/L	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U
GAMMA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-CHLORDANE	UG/L	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	UG/L	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	UG/L	0.05 U	0.05 U	0.05 U	0.05 U
METHOXYCHLOR	UG/L	0.5 U	0.5 U	0.5 U	0.5 U
TOXAPHENE	UG/L	1 U	1 U	1 U	1 U
Semi-volatiles					
2-METHYLNAPHTHALENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
ACENAPHTHENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
ACENAPHTHYLENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
ANTHRACENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U
BENZO(A)ANTHRACENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U
BENZO(A)PYRENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U
BENZO(B)FLUORANTHENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U
BENZO(K)FLUORANTHENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U
BENZO[G,H,I]PERYLENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U
CHRYSENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U
FLUORANTHENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U
FLUORENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U
GASOLINE RANGE ORGANICS	UG/L	10 U	11	10 U	12
INDENO(1,2,3-CD)PYRENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 UJ
NAPHTHALENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U
PHENANTHRENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U
PYRENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 UJ
TOTAL PETROLEUM HYDROCARBONS	UG/L	64	67	50 U	58

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
 Samples at Site OBL**

	Field Sample ID Lab Sample ID: Sample Date:	1-GW-1	1-GW-10	1-GW-11	1-GW-12	1-GW-13
		WP1916-4	WP1884-5	WP1884-1	WP1884-2	WP1884-3
		04/08/99	04/07/99	04/07/99	04/07/99	04/07/99
Volatiles						
1,1,1-TRICHLOROETHANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHENE (TOTAL)	UG/L	2 U				
1,2-DICHLOROPROPANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
2-BUTANONE	UG/L	1 B				
ACETONE	UG/L	1 B				
BENZENE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	UG/L	1 U				
BROMOMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	UG/L	1 U	5 U	5 U	5 U	5 U
CARBON TETRACHLORIDE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROBENZENE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	UG/L		8	2 J	4	2
CIS-1,3-DICHLOROPROPENE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
ETHYLBENZENE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	UG/L	1 U	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
STYRENE	UG/L	1 U	0.5 U	0.5 UJ	0.5 U	0.5 U
TETRACHLOROETHENE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
TOLUENE	UG/L	1 U	1 U	1 U	1 U	1 U
TOTAL XYLEMES	UG/L	3 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	UG/L		0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	UG/L	1 U	0.5 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	UG/L	1 U	2	0.6	0.5 U	0.7
VINYL CHLORIDE	UG/L	1 U	1 U	1 U	1 U	1 U
Inorganics						
CYANIDE, TOTAL	UG/L	10 U				

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
Samples at Site OBL**

Field Sample ID	1-GW-3	1-GW-5	1-GW-6	1-GW-7	1-GW-8
Lab Sample ID:	WP1884-6	WP1916-1	WP1916-2	WP1884-4	WP1855-1
Sample Date:	04/07/99	04/08/99	04/08/99	04/07/99	04/06/99

Analyte	Units	1-GW-3	1-GW-5	1-GW-6	1-GW-7	1-GW-8
Metals						
ALUMINUM	UG/L	24.8 B	22.4 B	15.9 B	11.1 B	20.9 B
ANTIMONY	UG/L	1.81 U	1.81 U	1.81 U	1.81 U	3.3 B
ARSENIC	UG/L	2.07 U	2.1 J	2.07 U	2.07 U	2.07 U
BARIUM	UG/L	84	54.4	91.5	88.5	81.2
BERYLLIUM	UG/L	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
CADMIUM	UG/L	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
CALCIUM	UG/L	57000	60000	30600	44400	56300
CHROMIUM	UG/L	1.2 J	0.59 U	0.65 J	0.81 J	0.59 U
COBALT	UG/L	4 J	9 J	8.9 J	0.64 U	5.5 J
COPPER	UG/L	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
IRON	UG/L	32600	2320	170 B	15.6 B	10900
LEAD	UG/L	1.4 J	1.2 J	1.4 J	1.09 U	2.1 B
MAGNESIUM	UG/L	27100	31100	12800	23600	29600
MANGANESE	UG/L	5470	3120	223	0.7 B	5080
MERCURY	UG/L	0.02 B	0.02 U	0.04 B	0.02 UL	0.02 B
NICKEL	UG/L	1.2 J	7.2 J	1.8 J	1 J	8.2 J
POTASSIUM	UG/L	2550	2260	3660	3360	2340
SELENIUM	UG/L	3.1 B	2.57 U	4 B	2.9 B	2.57 U
SILVER	UG/L	1.7 B	0.82 B	0.69 U	1 B	1.1 J
SODIUM	UG/L	38900	23400	20100	25200	20000
THALLIUM	UG/L	4.49 U	7.1 B	4.49 U	4.49 U	7.3 B
VANADIUM	UG/L	2.4 B	0.62 U	0.62 U	1.4 B	0.75 B
ZINC	UG/L	9.9 B	9.8 B	15.7 B	10.4 B	4.3 B
TPH						
GASOLINE RANGE ORGANICS	UG/L	220	57	15	11	100
TOTAL PETROLEUM HYDROCARBONS	UG/L	100	300	82	50 U	130
Pesticides/PCBs						
4,4'-DDD	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-CHLORDANE	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
AROCLOR 1016	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1221	UG/L	1 U	1 U	1 U	1 U	1 U
AROCLOR 1232	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
 Samples at Site OBL**

	Field Sample ID Lab Sample ID: Sample Date:	1-GW-3	1-GW-5	1-GW-6	1-GW-7	1-GW-8
		WP1884-6	WP1916-1	WP1916-2	WP1884-4	WP1855-1
		04/07/99	04/08/99	04/08/99	04/07/99	04/06/99
AROCLOR 1242	UG/L	0.5 U				
AROCLOR 1248	UG/L	0.5 U				
AROCLOR 1254	UG/L	0.5 U				
AROCLOR 1260	UG/L	0.5 U				
BETA BHC	UG/L	0.05 U				
DELTA BHC	UG/L	0.05 U				
DIELDRIN	UG/L	0.1 U				
ENDOSULFAN I	UG/L	0.05 U				
ENDOSULFAN II	UG/L	0.1 U				
ENDOSULFAN SULFATE	UG/L	0.1 U				
ENDRIN	UG/L	0.1 U				
ENDRIN ALDEHYDE	UG/L	0.1 U				
ENDRIN KETONE	UG/L	0.1 U				
GAMMA BHC	UG/L	0.05 U				
GAMMA-CHLORDANE	UG/L	0.05 U				
HEPTACHLOR	UG/L	0.05 U	0.05 U	0.055 J	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	UG/L	0.05 U				
METHOXYCHLOR	UG/L	0.5 U				
TOXAPHENE	UG/L	1 U	1 U	1 U	1 U	1 U
Semi-volatiles						
2-METHYLNAPHTHALENE	UG/L	0.2 UJ				
ACENAPHTHENE	UG/L	0.2 UJ				
ACENAPHTHYLENE	UG/L	0.2 UJ				
ANTHRACENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
BENZO(A)ANTHRACENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
BENZO(A)PYRENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
BENZO(B)FLUORANTHENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
BENZO(K)FLUORANTHENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
BENZO[G,H,I]PERYLENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
CHRYSENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
FLUORANTHENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
FLUORENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
GASOLINE RANGE ORGANICS	UG/L	220	57	15	11	100
INDENO(1,2,3-CD)PYRENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
NAPHTHALENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
PHENANTHRENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
PYRENE	UG/L	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
TOTAL PETROLEUM HYDROCARBONS	UG/L	100	300	82	50 U	130

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
Samples at Site OBL**

	Field Sample ID Lab Sample ID: Sample Date:	1-GW-3	1-GW-5	1-GW-6	1-GW-7	1-GW-8
		WP1884-6	WP1916-1	WP1916-2	WP1884-4	WP1855-1
		04/07/99	04/08/99	04/08/99	04/07/99	04/06/99
Volatiles						
1,1,1-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
1,1,2,2-TETRACHLOROETHANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
1,1-DICHLOROETHENE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
1,2-DICHLOROETHENE (TOTAL)	UG/L	2 U	3	7		
1,2-DICHLOROPROPANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
2-BUTANONE	UG/L		1 B	2 B		
ACETONE	UG/L	0.8 B	1 B	2 B		
BENZENE	UG/L	2	1 U	1 U	0.5 U	0.8
BROMODICHLOROMETHANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
BROMOFORM	UG/L	1 U	1 U	1 U		
BROMOMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	UG/L	1 U	1 U	1 U	5 U	5 U
CARBON TETRACHLORIDE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
CHLOROBENZENE	UG/L	170	38	0.6	0.5 U	87
CHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
CHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	UG/L				6	4
CIS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
DIBROMOCHLOROMETHANE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
ETHYLBENZENE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
METHYLENE CHLORIDE	UG/L	1 U	0.7 B	1 B	0.5 UJ	0.5 UJ
STYRENE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
TETRACHLOROETHENE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
TOLUENE	UG/L	1 U	1 U	1 U	1 U	1 U
TOTAL XYLEMES	UG/L	3 U	3 U	3 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	UG/L				0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	0.5 U	0.5 U
TRICHLOROETHENE	UG/L	1 U	0.6	4	2	0.6
VINYL CHLORIDE	UG/L	1 U	1 U	1 U	1 U	0.5
Inorganics						
CYANIDE, TOTAL	UG/L	10 U				

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
 Samples at Site OBL**

Field Sample ID:	1-GW-9	1-GW-DUP1
Lab Sample ID:	WP1855-2	WP1916-3
Sample Date:	04/06/99	04/08/99

Analyte	Units		
Metals			
ALUMINUM	UG/L	184 B	21.3 B
ANTIMONY	UG/L	1.81 U	1.81 U
ARSENIC	UG/L	2.07 U	2.07 U
BARIUM	UG/L	48.4	86.2
BERYLLIUM	UG/L	0.21 U	0.21 U
CADMIUM	UG/L	0.26 U	0.26 U
CALCIUM	UG/L	40400	28800
CHROMIUM	UG/L	0.81 J	0.87 J
COBALT	UG/L	7.9 J	6.2 J
COPPER	UG/L	0.55 U	0.55 U
IRON	UG/L	54.9 B	171 B
LEAD	UG/L	1.4 B	1.09 U
MAGNESIUM	UG/L	24800	12100
MANGANESE	UG/L	1730	213
MERCURY	UG/L	0.02 UL	0.03 B
NICKEL	UG/L	14.3 J	2 J
POTASSIUM	UG/L	1690	3920
SELENIUM	UG/L	3 B	3.3 B
SILVER	UG/L	0.69 U	2.3 B
SODIUM	UG/L	12700	19400
THALLIUM	UG/L	8 B	4.49 U
VANADIUM	UG/L	1.1 B	0.62 U
ZINC	UG/L	4.3 B	9.2 B
TPH			
GASOLINE RANGE ORGANICS	UG/L	36	17
TOTAL PETROLEUM HYDROCARBONS	UG/L	110	69
Pesticides/PCBs			
4,4'-DDD	UG/L	0.1 U	0.1 U
4,4'-DDE	UG/L	0.1 U	0.1 U
4,4'-DDT	UG/L	0.1 U	0.1 U
ALDRIN	UG/L	0.05 U	0.05 U
ALPHA BHC	UG/L	0.05 U	0.05 U
ALPHA-CHLORDANE	UG/L	0.05 U	0.05 U
AROCLOR 1016	UG/L	0.5 U	0.5 U
AROCLOR 1221	UG/L	1 U	1 U
AROCLOR 1232	UG/L	0.5 U	0.5 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
 Samples at Site OBL**

Field Sample ID	1-GW-9	1-GW-DUP1
Lab Sample ID:	WP1855-2	WP1916-3
Sample Date:	04/06/99	04/08/99
AROCLOR 1242	UG/L	0.5 U
AROCLOR 1248	UG/L	0.5 U
AROCLOR 1254	UG/L	0.5 U
AROCLOR 1260	UG/L	0.5 U
BETA BHC	UG/L	0.05 U
DELTA BHC	UG/L	0.05 U
DIELDRIN	UG/L	0.1 U
ENDOSULFAN I	UG/L	0.05 U
ENDOSULFAN II	UG/L	0.1 U
ENDOSULFAN SULFATE	UG/L	0.1 U
ENDRIN	UG/L	0.1 U
ENDRIN ALDEHYDE	UG/L	0.1 U
ENDRIN KETONE	UG/L	0.1 U
GAMMA BHC	UG/L	0.05 U
GAMMA-CHLORDANE	UG/L	0.05 U
HEPTACHLOR	UG/L	0.05 U
HEPTACHLOR EPOXIDE	UG/L	0.05 U
METHOXYCHLOR	UG/L	0.5 U
TOXAPHENE	UG/L	1 U
Semi-volatiles		
2-METHYLNAPHTHALENE	UG/L	0.2 UJ
ACENAPHTHENE	UG/L	0.2 UJ
ACENAPHTHYLENE	UG/L	0.2 UJ
ANTHRACENE	UG/L	0.2 U
BENZO(A)ANTHRACENE	UG/L	0.2 U
BENZO(A)PYRENE	UG/L	0.2 U
BENZO(B)FLUORANTHENE	UG/L	0.2 U
BENZO(K)FLUORANTHENE	UG/L	0.2 U
BENZO[G,H,I]PERYLENE	UG/L	0.2 U
CHRYSENE	UG/L	0.2 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.2 U
FLUORANTHENE	UG/L	0.2 U
FLUORENE	UG/L	0.2 U
GASOLINE RANGE ORGANICS	UG/L	36
INDENO(1,2,3-CD)PYRENE	UG/L	0.2 U
NAPHTHALENE	UG/L	0.2 U
PHENANTHRENE	UG/L	0.2 U
PYRENE	UG/L	0.2 U
TOTAL PETROLEUM HYDROCARBONS	UG/L	110
		69

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-1 Analysis Data for Groundwater
 Samples at Site OBL**

Field Sample ID	1-GW-9	1-GW-DUP1	
Lab Sample ID:	WP1855-2	WP1916-3	
Sample Date:	04/06/99	04/08/99	
Volatiles			
1,1,1-TRICHLOROETHANE	UG/L	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	UG/L	1 U	1 U
1,1,2-TRICHLOROETHANE	UG/L	1 U	1 U
1,1-DICHLOROETHANE	UG/L	1 U	1 U
1,1-DICHLOROETHENE	UG/L	1 U	1 U
1,2-DICHLOROETHANE	UG/L	1 U	1 U
1,2-DICHLOROETHENE (TOTAL)	UG/L	34	7
1,2-DICHLOROPROPANE	UG/L	1 U	1 U
2-BUTANONE	UG/L	1 B	1 B
ACETONE	UG/L	2 B	4 B
BENZENE	UG/L	1 U	1 U
BROMODICHLOROMETHANE	UG/L	1 U	1 U
BROMOFORM	UG/L	1 U	1 U
BROMOMETHANE	UG/L	1 U	1 U
CARBON DISULFIDE	UG/L	1 U	1 U
CARBON TETRACHLORIDE	UG/L	1 U	1 U
CHLOROBENZENE	UG/L	24	1 U
CHLOROETHANE	UG/L	0.7	1 U
CHLOROFORM	UG/L	1 U	1 U
CHLOROMETHANE	UG/L	1 U	1 U
CIS-1,2-DICHLOROETHENE	UG/L		
CIS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U
DIBROMOCHLOROMETHANE	UG/L	1 U	1 U
ETHYLBENZENE	UG/L	1 U	1 U
METHYLENE CHLORIDE	UG/L	1 U	1 B
STYRENE	UG/L	1 U	1 U
TETRACHLOROETHENE	UG/L	1 U	1 U
TOLUENE	UG/L	1 U	1 U
TOTAL XYLENES	UG/L	3 U	3 U
TRANS-1,2-DICHLOROETHENE	UG/L		
TRANS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U
TRICHLOROETHENE	UG/L	2	4
VINYL CHLORIDE	UG/L	1	1 U
Inorganics			
CYANIDE, TOTAL	UG/L	10 U	10 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-2 Analysis Data for
 Sediment Samples at Site OBL**

Field Sample ID	1-SD-10	1-SD-11	1-SD-18	1-SD-8	1-SD-9	P1-SD-7	SD-DUP8
Lab Sample ID:	WP1985-14	WP1985-15	WP1985-18	WP2036-1	WP1985-16	WP1985-17	WP2036-2
Sample Date:	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99	04/16/99

Analyte	Units	1-SD-10	1-SD-11	1-SD-18	1-SD-8	1-SD-9	P1-SD-7	SD-DUP8
Volatiles								
1,1,1-TRICHLOROETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
1,1,2-TRICHLOROETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
1,1-DICHLOROETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
1,1-DICHLOROETHENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
1,2-DICHLOROETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
1,2-DICHLOROETHENE (TOTAL)	UG/KG	12 U	28 UJ		16 U	11 U	12 U	17 U
1,2-DICHLOROPROPANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
2-BUTANONE	UG/KG	12 UJ	28 U		16 UJ	11 UJ	12 UJ	17 UJ
2-HEXANONE	UG/KG	12 U	28 U		16 U	11 U	12 U	17 U
4-METHYL-2-PENTANONE	UG/KG	12 U	28 U		16 U	11 U	12 U	17 U
ACETONE	UG/KG	12 U	110 J		16 U	11 U	12 U	17 U
BENZENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
BROMODICHLOROMETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
BROMOFORM	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
BROMOMETHANE	UG/KG	6 U	14 UJ		8 UJ	6 UJ	6 UJ	8 UJ
CARBON DISULFIDE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
CARBON TETRACHLORIDE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
CHLOROBENZENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
CHLOROETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
CHLOROFORM	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
CHLOROMETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
CIS-1,3-DICHLOROPROPENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
DIBROMOCHLOROMETHANE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
ETHYLBENZENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
METHYLENE CHLORIDE	UG/KG	5	14 U		5	6 U	56 J	8 U
STYRENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
TETRACHLOROETHENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
TOLUENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
TOTAL XYLEMES	UG/KG	18 U	42 U		25 U	17 U	18 U	25 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
TRICHLOROETHENE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
VINYL CHLORIDE	UG/KG	6 U	14 U		8 U	6 U	6 U	8 U
Metals								
ALUMINUM	MG/KG	3130	10400		14500	6360	11000	15400
ARSENIC	MG/KG	3.2	2.8		6.9	2.2	1.5	6.1
BARIUM	MG/KG	21.4	107		48.4	42.9	50.5	63.8
BERYLLIUM	MG/KG	0.17 B	0.38 B		0.59 B	0.38 B	0.39 B	0.48 B

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-2 Analysis Data for
 Sediment Samples at Site OBL**

Field Sample ID	1-SD-10	1-SD-11	1-SD-18	1-SD-8	1-SD-9	P1-SD-7	SD-DUP8	
Lab Sample ID:	WP1985-14	WP1985-15	WP1985-18	WP2036-1	WP1985-16	WP1985-17	WP2036-2	
Sample Date:	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99	04/16/99	
Analyte		Units						
CADMIUM	MG/KG	0.24 U	0.87 U		0.27 U	0.17 U	0.21 U	0.23 U
CALCIUM	MG/KG	1010	9980		1830	865	796	2250
CHROMIUM	MG/KG	25.5 J	29 J		49 J	26.9 J	15.5 J	33.7 J
COBALT	MG/KG	2.6 J	9.4 J		12.6	6.6	4	10
COPPER	MG/KG	9.5	52.2		14.7	22	12.5	15
IRON	MG/KG	11000	31700		29400	16200	10500	39100
LEAD	MG/KG	10.5 L	110 L		40.1 L	10.1 L	6.1 L	30.9 L
MAGNESIUM	MG/KG	1370 L	4430 L		18300 L	4080 L	2510 L	11000 L
MANGANESE	MG/KG	462	326		572	545	107	608
MERCURY	MG/KG	0.02 J	0.13 J		0.05 J	0.02 J	0.01 J	0.06 J
NICKEL	MG/KG	7.3	10.9 J		217	35.1	5.8	127
POTASSIUM	MG/KG	466	2130		1320	1150	1420	1310
SELENIUM	MG/KG	0.54 J	1.5 J		0.56 J	0.6	0.23 U	0.77 J
SILVER	MG/KG	0.47 B	1.14 U		0.35 U	0.22 U	0.27 U	0.65 B
SODIUM	MG/KG	63.6	213		90.4	51	65.4	106
THALLIUM	MG/KG	0.81 B	0.8 U		0.39 U	0.42 B	0.44 B	1.7 B
VANADIUM	MG/KG	15.4 J	44.2 J		33.4 J	24.4 J	31.1 J	34.2 J
ZINC	MG/KG	16	153		77.7	38.3	25.3	103
TPH								
GASOLINE RANGE ORGANICS	MG/KG	3.3 U	14 U		5.8 U	3 U	3 U	5.5 U
TOTAL PETROLEUM HYDROCARBONS	MG/KG	20	1300 J		250	38	75	150
Pesticides/PCBs								
4,4'-DDD	UG/KG	4.3 U	18 U	150	20 J	34 J	4 U	17 J
4,4'-DDE	UG/KG	4.3 U	18 U	140	14	19	4 U	13
4,4'-DDT	UG/KG	4.3 U	18 U	54 J	7.6 U	4.3 U	4 U	7.6 U
ALDRIN	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
ALPHA BHC	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
ALPHA-CHLORDANE	UG/KG	2.2 U	9.5 U	66 J	3.9 U	3.5 J	2 U	3.9 U
BETA BHC	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
DELTA BHC	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
DIELDRIN	UG/KG	4.3 U	18 U	22 U	7.6 U	4.3 U	4 U	7.6 U
ENDOSULFAN I	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
ENDOSULFAN II	UG/KG	4.3 U	18 U	22 U	7.6 U	4.3 U	4 U	7.6 U
ENDOSULFAN SULFATE	UG/KG	4.3 U	18 U	22 U	7.6 U	4.3 U	4 U	7.6 U
ENDRIN	UG/KG	4.3 U	18 U	22 U	7.6 U	4.3 U	4 U	7.6 U
ENDRIN ALDEHYDE	UG/KG	4.3 U	18 U	22 U	7.6 U	4.3 U	4 U	7.6 U
ENDRIN KETONE	UG/KG	4.3 UJ	18 UJ	22 U	7.6 UJ	4.3 UJ	4 UJ	7.6 UJ
GAMMA BHC	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
GAMMA-CHLORDANE	UG/KG	2.2 U	9.5 U	62	3.9 U	3.8	2 U	3.9 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-2 Analysis Data for
 Sediment Samples at Site OBL**

Field Sample ID	1-SD-10	1-SD-11	1-SD-18	1-SD-8	1-SD-9	P1-SD-7	SD-DUP8	
Lab Sample ID:	WP1985-14	WP1985-15	WP1985-18	WP2036-1	WP1985-16	WP1985-17	WP2036-2	
Sample Date:	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99	04/16/99	
Analyte		Units						
HEPTACHLOR	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
HEPTACHLOR EPOXIDE	UG/KG	2.2 U	9.5 U	12 U	3.9 U	2.2 U	2 U	3.9 U
METHOXYCHLOR	UG/KG	22 UJ	95 UJ	120 U	39 UJ	22 UJ	20 UJ	39 UJ
TOXAPHENE	UG/KG	43 U	180 U	220 U	76 U	43 U	40 U	76 U
AROCLOR 1016	UG/KG	22 U	95 U		39 U	22 U	20 U	39 U
AROCLOR 1221	UG/KG	43 U	180 U		76 U	43 U	40 U	76 U
AROCLOR 1232	UG/KG	22 U	95 U		39 U	22 U	20 U	39 U
AROCLOR 1242	UG/KG	22 U	95 U		39 U	22 U	20 U	39 U
AROCLOR 1248	UG/KG	22 U	95 U		39 U	22 U	20 U	39 U
AROCLOR 1254	UG/KG	22 U	95 U		39 U	22 U	20 U	39 U
AROCLOR 1260	UG/KG	22 U	95 U		39 U	22 U	20 U	39 U
Semi-Volatiles								
2-METHYLNAPHTHALENE	UG/KG	26 U	5		9	9	3	16
ACENAPHTHENE	UG/KG	1	11		55	33	18	50
ACENAPHTHYLENE	UG/KG	26 U	15		4	2	1	6
ANTHRACENE	UG/KG	3	40		130	54	27	140
BENZO(A)ANTHRACENE	UG/KG	17	330		490	230	150	370 J
BENZO(A)PYRENE	UG/KG	15 J	670 J		440	270	120	390 J
BENZO(B)FLUORANTHENE	UG/KG	26 J	730 J		640	470	150 J	400 J
BENZO(K)FLUORANTHENE	UG/KG	7 J	160 J		150	100	37	140
BENZO[G,H,I]PERYLENE	UG/KG	10 J	420 J		240	110	79	200
CHRYSENE	UG/KG	14	330		370	280	120	310 J
DIBENZ(A,H)ANTHRACENE	UG/KG	4 J	64 J		68	33	19	46
FLUORANTHENE	UG/KG	22	280		760	450	140	710
FLUORENE	UG/KG	1	15		46	23	13	72
INDENO(1,2,3-CD)PYRENE	UG/KG	9 J	440 J		310	150	68	230 J
NAPHTHALENE	UG/KG	26 U	11		9	17	2	20
PHENANTHRENE	UG/KG	12	130		510	310	160	640
PYRENE	UG/KG	34	800		1300	650 J	550 J	950 J
Inorganics								
PH (LABORATORY)	PH	7.4	6.2	7.5	7.6	7.5	7.4	7.6
SOLIDS-TOTAL RESIDUE (TS)	WT %	75	18	73	43	77	80	44
CYANIDE, TOTAL	MG/KG	1 U	1 U		1 U	1 U	1 U	1 U
Grain Size								
CLAY	%	2.6	3.7		11.8	2.3	13.3	
SILT	%	6.2	35.9		7.5	11.3	35.5	
FINE SAND	%	50.3	15.4		58.9	37.7	27	
MEDIUM SAND	%	26.7	14.4		20.9	19.8	13.2	
COARSE SAND AND LARGER	%	14.2	30.6		0.9	28.9	11	

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-2 Analysis Data for
 Sediment Samples at Site OBL**

Field Sample ID:	1-SD-10	1-SD-11	1-SD-18	1-SD-8	1-SD-9	P1-SD-7	SD-DUP8
Lab Sample ID:	WP1985-14	WP1985-15	WP1985-18	WP2036-1	WP1985-16	WP1985-17	WP2036-2
Sample Date:	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99	04/16/99

Analyte	Units						
Other							
TOTAL ORGANIC CARBON	MG/KG	970	9600		8300	1500	2200

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-3 Analysis Data for Surface Water Samples at Site OBL

Field Sample ID	1-SW-10	1-SW-11	1-SW-16	1-SW-8	P1-SW-11	P1-SW-7	SW-DUP2
Lab Sample ID:	WP1986-8	WP1986-9	WP1986-10	WP1986-6	WP2037-9	WP1986-11	WP1986-7
Sample Date:	04/14/99	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99

Analyte	Units	1-SW-10	1-SW-11	1-SW-16	1-SW-8	P1-SW-11	P1-SW-7	SW-DUP2
VOCs								
1,1,1-TRICHLOROETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
1,1,2,2-TETRACHLOROETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
1,1,2-TRICHLOROETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
1,1-DICHLOROETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
1,1-DICHLOROETHENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
1,2-DICHLOROETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
1,2-DICHLOROETHENE (TOTAL)								
UG/L	2 U	2 U	2 U	2 U			2 U	2 U
1,2-DICHLOROPROPANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
2-BUTANONE								
UG/L	0.8 J			5 J			1 J	2 J
ACETONE								
UG/L	6 B	4 B	4 B	5 B			6 B	5 B
BENZENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
BROMODICHLOROMETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
BROMOFORM								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
BROMOMETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
CARBON DISULFIDE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
CARBON TETRACHLORIDE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
CHLOROBENZENE								
UG/L	1 U	1 U	1 U	5			1 U	6
CHLOROETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
CHLOROFORM								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
CHLOROMETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
CIS-1,3-DICHLOROPROPENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
DIBROMOCHLOROMETHANE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
ETHYLBENZENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
METHYLENE CHLORIDE								
UG/L	3 J	3 J	2 J	2			2 J	4 J
STYRENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
TETRACHLOROETHENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
TOLUENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
TOTAL XYLEMES								
UG/L	3 U	3 U	3 U	3 U			3 U	3 U
TRANS-1,3-DICHLOROPROPENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
TRICHLOROETHENE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
VINYL CHLORIDE								
UG/L	1 U	1 U	1 U	1 U			1 U	1 U
Metals								
ALUMINUM	UG/L	52.8 J	256	240	284	20.93 U	161	131
ANTIMONY	UG/L	1.9 B	1.81 U	1.81 U	1.81 U	1.81 U	1.81 U	1.81 U
ARSENIC	UG/L	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U
BARIUM	UG/L	36.3 J	42 J	44.7 J	56.9 J	38.5 J	39.9 J	53 J
BERYLLIUM	UG/L	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
CADMIUM	UG/L	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
CALCIUM	UG/L	24700	21200	25800	43700	21400	24700	44700

Organic Qual.:U=not detected,B=in blank,J= estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U = not detected,N= MS outside QC,B=Above IDL,below MDL

**Table A-3 Analysis Data for Surface
 Water Samples at Site OBL**

Field Sample ID	1-SW-10	1-SW-11	1-SW-16	1-SW-8	P1-SW-11	P1-SW-7	SW-DUP2
Lab Sample ID:	WP1986-8	WP1986-9	WP1986-10	WP1986-6	WP2037-9	WP1986-11	WP1986-7
Sample Date:	04/14/99	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99

Analyte	Units	1-SW-10	1-SW-11	1-SW-16	1-SW-8	P1-SW-11	P1-SW-7	SW-DUP2
CHROMIUM	UG/L	0.59 U	1.4 J	0.73 J	1 J	0.9 J	0.59 U	0.59 U
COBALT	UG/L	0.64 U	0.64 U	0.88 J	2.3 J	0.64 U	0.64 U	2.2 J
COPPER	UG/L	3 B	3.9 J	4 J	4.5 J	5 J	4.1 J	3.9 J
IRON	UG/L	266	769	327	6370	12.3 U	238	5070
LEAD	UG/L	1.09 U	1.09 U	1.09 U	2 J	3.9 J	1.09 U	1.7 J
MAGNESIUM	UG/L	10100	8570	9650	17500	8850	9180	18400
MANGANESE	UG/L	35.8	86.2	14.2	2160	13.4	12.2	2350
MERCURY	UG/L	0.02 J	0.03 J	0.02 U	0.03 J	0.02 U	0.02 U	0.02 U
NICKEL	UG/L	0.86 J	2.5 J	2.7 J	18.4 J	0.85 U	1.5 J	19.1 J
POTASSIUM	UG/L	2370	2090	1890	8870	1550	1940	9020
SELENIUM	UG/L	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U

Organic Qual.:U=not detected,B=in blank,J= estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U = not detected,N= MS outside QC,B=Above IDL,below MDL

Table A-3 Analysis Data for Surface Water Samples at Site OBL

Field Sample ID	1-SW-10	1-SW-11	1-SW-16	1-SW-8	P1-SW-11	P1-SW-7	SW-DUP2
Lab Sample ID:	WP1986-8	WP1986-9	WP1986-10	WP1986-6	WP2037-9	WP1986-11	WP1986-7
Sample Date:	04/14/99	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99

Analyte	Units						
SILVER	UG/L	0.69 U	0.69 U	0.69 B	0.69 U	0.69 U	0.69 U
SODIUM	UG/L	18700	13300	15700	16300	14400	15000
THALLIUM	UG/L	4.49 U					
VANADIUM	UG/L	0.62 U	1.4 B	0.94 B	0.62 U	0.62 U	0.85 B
ZINC	UG/L	6.6 J	6.6 J	5 J	88.7	17 J	5.8 J
TPH							
GASOLINE RANGE ORGANICS	UG/L	10 U	10 U	10 U	42		10 U
TOTAL PETROLEUM HYDROCARBO	UG/L	76	64	92	140		60 U
4,4'-DDD	UG/L	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U
4,4'-DDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U
4,4'-DDT	UG/L	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ		0.1 UJ
ALDRIN	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
ALPHA BHC	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
ALPHA-CHLORDANE	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
BETA BHC	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
DELTA BHC	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
DIELDRIN	UG/L	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U
ENDOSULFAN I	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
ENDOSULFAN II	UG/L	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U
ENDOSULFAN SULFATE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U
ENDRIN	UG/L	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ		0.1 UJ
ENDRIN ALDEHYDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U
ENDRIN KETONE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U		0.1 U
GAMMA BHC	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
GAMMA-CHLORDANE	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
HEPTACHLOR	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
HEPTACHLOR EPOXIDE	UG/L	0.05 U	0.06 U	0.06 U	0.05 U		0.06 U
METHOXYCHLOR	UG/L	0.5 UJ	0.6 UJ	0.6 UJ	0.5 UJ		0.6 UJ
TOXAPHENE	UG/L	1 U	1.1 U	1.1 U	1 U		1.2 U
AROCLOR 1016	UG/L	0.5 U	0.6 U	0.6 U	0.5 U		0.6 U
AROCLOR 1221	UG/L	1 U	1.1 U	1.1 U	1 U		1.2 U
AROCLOR 1232	UG/L	0.5 U	0.6 U	0.6 U	0.5 U		0.6 U
AROCLOR 1242	UG/L	0.5 U	0.6 U	0.6 U	0.5 U		0.6 U
AROCLOR 1248	UG/L	0.5 U	0.6 U	0.6 U	0.5 U		0.6 U
AROCLOR 1254	UG/L	0.5 U	0.6 U	0.6 U	0.5 U		0.6 U
AROCLOR 1260	UG/L	0.5 U	0.6 U	0.6 U	0.5 U		0.6 U
Semi-Volatiles							
2-METHYLNAPHTHALENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ
ACENAPHTHENE	UG/L	0.2 U	0.2 U	0.2 U	0.3 U		0.2 U
ACENAPHTHYLENE	UG/L	0.2 U	0.2 U	0.2 U	0.3 U		0.2 U
ANTHRACENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ

Organic Qual.:U=not detected,B=in blank,J= estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U = not detected,N= MS outside QC,B=Above IDL,below MDL

**Table A-3 Analysis Data for Surface
 Water Samples at Site OBL**

Field Sample ID	1-SW-10	1-SW-11	1-SW-16	1-SW-8	P1-SW-11	P1-SW-7	SW-DUP2
Lab Sample ID:	WP1986-8	WP1986-9	WP1986-10	WP1986-6	WP2037-9	WP1986-11	WP1986-7
Sample Date:	04/14/99	04/14/99	04/14/99	04/14/99	04/16/99	04/14/99	04/14/99

Analyte	Units	1-SW-10	1-SW-11	1-SW-16	1-SW-8	P1-SW-11	P1-SW-7	SW-DUP2
BENZO(A)ANTHRACENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
BENZO(A)PYRENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
BENZO(B)FLUORANTHENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
BENZO(K)FLUORANTHENE	UG/L	0.2 U	0.2 U	0.2 U	0.3 U		0.2 U	0.2 U
BENZO[G,H,I]PERYLENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
CHRYSENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
DIBENZ(A,H)ANTHRACENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
FLUORANTHENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
FLUORENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
INDENO(1,2,3-CD)PYRENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
NAPHTHALENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
PHENANTHRENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
PYRENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.3 UJ		0.2 UJ	0.2 UJ
Inorganics								
PH (LABORATORY)	PH	7.6	7.4	7.2	7		7.6	6.9
CYANIDE, TOTAL	UG/L	10 U	10 U	10 U	10 U		10 U	10 U

Organic Qual.:U=not detected,B=in blank,J= estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U = not detected,N= MS outside QC,B=Above IDL,below MDL

Table A-4 Analysis data for Groundwater samples at Site FTA

Field Sample ID	2-DUP4	2-GW-1	2-GW-11	2-GW-12	2-GW-13	2-GW-2
Lab Sample ID:	WP1969-2	WP1916-5	WP1940-2	WP1940-3	WP1916-9	WP1940-1
Sample Date:	04/13/99	04/08/99	04/12/99	04/12/99	04/09/99	04/12/99

Analyte	Units	2-DUP4	2-GW-1	2-GW-11	2-GW-12	2-GW-13	2-GW-2
Metals							
ALUMINUM	UG/L	21.7 B	20.1 B	12 B	10.76 U	46.3 B	10.76 U
ANTIMONY	UG/L	1.81 U	1.81 U	1.81 U	2.8 B	1.81 U	1.81 U
ARSENIC	UG/L	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U
BARIUM	UG/L	137 J	51.3	5.6 J	34.6 J	8.5	53.2 J
BERYLLIUM	UG/L	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
CADMIUM	UG/L	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
CALCIUM	UG/L	12300	24000	9890	18100	14800	12200
CHROMIUM	UG/L	0.59 U	0.59 U	1.6 B	0.59 U	0.59 U	0.59 U
COBALT	UG/L	10.8 J	0.64 U	0.64 U	0.64 U	4 J	0.64 U
COPPER	UG/L	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
IRON	UG/L	13800	46.1 B	48.8 B	17.5 B	63.9 B	3430
LEAD	UG/L	1.09 U	1.09 U	1.3 B	1.09 U	1.09 U	1.3 B
MAGNESIUM	UG/L	5180	12000	3930	8760	4610	2920
MANGANESE	UG/L	2910 J	1.4 B	98.8 J	2.2 B	5.6	162 J
MERCURY	UG/L	0.02 U	0.02 U	0.02 U	0.02 U	0.02 B	0.02 U
NICKEL	UG/L	0.85 U	1.6 J	0.85 U	1.9 B	0.85 U	0.85 U
POTASSIUM	UG/L	989 J	1200	1320	1320	1030	2270
SELENIUM	UG/L	2.57 U	2.57 U	2.57 U	2.57 U	3.7 B	3.6 B
SILVER	UG/L	0.69 U	0.69 U	0.78 B	0.99 B	0.69 U	0.69 U
SODIUM	UG/L	10400	9390	9690	12900	10300	10400
THALLIUM	UG/L	11.9 B	4.49 U	4.49 U	4.49 U	4.49 U	4.49 U
VANADIUM	UG/L	0.62 U	0.62 U	0.62 U	0.62 U	0.62 U	0.62 U
ZINC	UG/L	6.9 B	2.7 B	8.5 B	6.4 B	11.5 B	5.2 B
TPH							
GASOLINE RANGE ORGANICS	UG/L		10 U	10 U	10 U	10 U	10 U
TOTAL PETROLEUM HYDROCARBONS	UG/L		50 U	50 U	95	50 U	65
Pesticides/PCBs							
4,4'-DDD	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-CHLORDANE	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
AROCLOR 1016	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1221	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR 1232	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1242	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1248	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1254	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1260	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BETA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DELTA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-4 Analysis data for Groundwater samples at Site FTA

Field Sample ID	2-DUP4	2-GW-1	2-GW-11	2-GW-12	2-GW-13	2-GW-2
Lab Sample ID:	WP1969-2	WP1916-5	WP1940-2	WP1940-3	WP1916-9	WP1940-1
Sample Date:	04/13/99	04/08/99	04/12/99	04/12/99	04/09/99	04/12/99

Analyte	Units	2-DUP4	2-GW-1	2-GW-11	2-GW-12	2-GW-13	2-GW-2
DIELDRIN	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN II	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
GAMMA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-CHLORDANE	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
METHOXYCHLOR	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOXAPHENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatiles							
2-METHYLNAPHTHALENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 U
ACENAPHTHENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
ACENAPHTHYLENE	UG/L	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
ANTHRACENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
BENZO(A)ANTHRACENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
BENZO(A)PYRENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 U
BENZO(B)FLUORANTHENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 U
BENZO(K)FLUORANTHENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 U
BENZO[G,H,I]PERYLENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 U
CHRYSENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.1 UJ	0.2 U
FLUORANTHENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
FLUORENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
GASOLINE RANGE ORGANICS	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
INDENO(1,2,3-CD)PYRENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 U
NAPHTHALENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
PHENANTHRENE	UG/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
PYRENE	UG/L	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
TOTAL PETROLEUM HYDROCARBONS	UG/L	160	50 U	50 U	95	50 U	65
Volatiles							
1,1,1-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	UG/L	1 U	1 U	1 U	3	1 U	1 U
1,1,2-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHENE (TOTAL)	UG/L	0.6 B	2 U	2 U	2 U	2 U	2 U
1,2-DICHLOROPROPANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	UG/L	2 B	8 B			1 B	

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-4 Analysis data for Groundwater samples at Site FTA

Field Sample ID	2-DUP4	2-GW-1	2-GW-11	2-GW-12	2-GW-13	2-GW-2
Lab Sample ID:	WP1969-2	WP1916-5	WP1940-2	WP1940-3	WP1916-9	WP1940-1
Sample Date:	04/13/99	04/08/99	04/12/99	04/12/99	04/09/99	04/12/99

Analyte	Units	6 B	1 B	4 B	3 B	4 B	4 B
ACETONE	UG/L						
BENZENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
BROMOFORM	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CARBON TETRACHLORIDE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	UG/L	3 B	1 U	2 B	2 B	4 B	1 B
STYRENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TOTAL XYLENES	UG/L	3 U	3 U	3 U	3 U	3 U	3 U
TRANS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	UG/L	0.5	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
Inorganics							
CYANIDE, TOTAL	UG/L	10 U					

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-4 Analysis data for Groundwater samples

Field Sample ID	2-GW-3	2-GW-4	2-GW-5	2-GW-7	2-GW-DUP2	2-GW-DUP3
Lab Sample ID:	WP1940-4	WP1969-1	WP1916-8	WP1916-6	WP1940-6	WP1940-5
Sample Date:	04/12/99	04/13/99	04/09/99	04/08/99	04/12/99	04/12/99

Analyte	Units	2-GW-3	2-GW-4	2-GW-5	2-GW-7	2-GW-DUP2	2-GW-DUP3
Metals							
ALUMINUM	UG/L	17.2 B	24.8 B	132 B	10.76 U	23.4 B	14 B
ANTIMONY	UG/L	1.9 B	1.81 U	1.81 U	1.81 U	1.81 U	3.1 J
ARSENIC	UG/L	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.9 B
BARIUM	UG/L	38.4 J	135 J	200	27.9	56.5 J	39.5 J
BERYLLIUM	UG/L	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
CADMIUM	UG/L	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
CALCIUM	UG/L	18400	12200	51300	10100	12400	18800
CHROMIUM	UG/L	0.87 B	0.96 B	0.59 U	0.59 U	0.59 U	0.97 B
COBALT	UG/L	0.64 U	10.1 J	3.5 B	0.64 U	0.94 B	0.64 U
COPPER	UG/L	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U	0.55 U
IRON	UG/L	12.3 U	13400	39400	5.1 B	4580	23.5 J
LEAD	UG/L	1.09 U	1.7 B	3.5 J	1.09 U	1.09 U	1.4 B
MAGNESIUM	UG/L	6680	5150	10900	5010	3080	6820
MANGANESE	UG/L	104 J	2890 J	3870	0.47 B	291 J	103 J
MERCURY	UG/L	0.02 U	0.02 U	0.03 B	0.02 B	0.02 B	0.02 U
NICKEL	UG/L	0.85 U	1.7 B	0.85 U	1 J	0.85 U	0.85 U
POTASSIUM	UG/L	1870	1670	4120	843 J	1900	2410
SELENIUM	UG/L	2.8 B	2.57 U	3.8 B	2.57 U	2.57 U	2.57 U
SILVER	UG/L	1.3 B	0.69 U	0.69 U	0.69 U	0.69 U	0.85 B
SODIUM	UG/L	15300	10300	9820	9200	11500	16100
THALLIUM	UG/L	4.49 U	4.49 U	4.49 U	4.49 U	4.49 U	4.49 U
VANADIUM	UG/L	0.62 U	0.62 U	2 B	0.62 U	0.62 U	0.62 U
ZINC	UG/L	8.7 B	10.1 B	10.3 B	6.2 B	4.2 B	10.1 B
TPH							
GASOLINE RANGE ORGANICS	UG/L	10 U	10 U	10 U	10 U	10 U	10 U
TOTAL PETROLEUM HYDROCARBONS	UG/L	50 U	150	77	61	50 U	50 U
Pesticides/PCBs							
4,4'-DDD	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-CHLORDANE	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
AROCLOR 1016	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1221	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR 1232	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1242	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1248	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1254	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
AROCLOR 1260	UG/L	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BETA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DELTA BHC	UG/L	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-4 Analysis data for Groundwater samples

Field Sample ID	2-GW-3	2-GW-4	2-GW-5	2-GW-7	2-GW-DUP2	2-GW-DUP3
Lab Sample ID:	WP1940-4	WP1969-1	WP1916-8	WP1916-6	WP1940-6	WP1940-5
Sample Date:	04/12/99	04/13/99	04/09/99	04/08/99	04/12/99	04/12/99

Analyte	Units					
DIELDRIN	UG/L	0.1 U				
ENDOSULFAN I	UG/L	0.05 U				
ENDOSULFAN II	UG/L	0.1 U				
ENDOSULFAN SULFATE	UG/L	0.1 U				
ENDRIN	UG/L	0.1 U				
ENDRIN ALDEHYDE	UG/L	0.1 U				
ENDRIN KETONE	UG/L	0.1 U				
GAMMA BHC	UG/L	0.05 U				
GAMMA-CHLORDANE	UG/L	0.05 U				
HEPTACHLOR	UG/L	0.05 U				
HEPTACHLOR EPOXIDE	UG/L	0.05 U				
METHOXYCHLOR	UG/L	0.5 U				
TOXAPHENE	UG/L	1 U	1 U	1 U	1 U	1 U
Semivolatiles						
2-METHYLNAPHTHALENE	UG/L	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 U
ACENAPHTHENE	UG/L	0.2 UJ				
ACENAPHTHYLENE	UG/L	0.2 UJ				
ANTHRACENE	UG/L	0.2 U				
BENZO(A)ANTHRACENE	UG/L	0.2 U				
BENZO(A)PYRENE	UG/L	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U
BENZO(B)FLUORANTHENE	UG/L	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U
BENZO(K)FLUORANTHENE	UG/L	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U
BENZO[G,H,I]PERYLENE	UG/L	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U
CHRYSENE	UG/L	0.2 U				
DIBENZ(A,H)ANTHRACENE	UG/L	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U
FLUORANTHENE	UG/L	0.2 U				
FLUORENE	UG/L	0.2 U				
GASOLINE RANGE ORGANICS	UG/L	10 U				
INDENO(1,2,3-CD)PYRENE	UG/L	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U
NAPHTHALENE	UG/L	0.2 U				
PHENANTHRENE	UG/L	0.2 U				
PYRENE	UG/L	0.2 U				
TOTAL PETROLEUM HYDROCARBONS	UG/L	50 U	150	77	61	50 U
Volatiles						
1,1,1-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	UG/L	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHENE (TOTAL)	UG/L	2 U	0.6	2 U	2 U	0.6
1,2-DICHLOROPROPANE	UG/L	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	UG/L		1 B	1 B	11 J	

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-4 Analysis data for Groundwater samples

Field Sample ID	2-GW-3	2-GW-4	2-GW-5	2-GW-7	2-GW-DUP2	2-GW-DUP3
Lab Sample ID:	WP1940-4	WP1969-1	WP1916-8	WP1916-6	WP1940-6	WP1940-5
Sample Date:	04/12/99	04/13/99	04/09/99	04/08/99	04/12/99	04/12/99

Analyte	Units	3 B	6 B	5 B	3 B	3 B	
ACETONE	UG/L						
BENZENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
BROMOFORM	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CARBON TETRACHLORIDE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	UG/L	2 B	3 B	5 B	0.6 B	1 B	2 B
STYRENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TOTAL XYLEMES	UG/L	3 U	3 U	3 U	3 U	3 U	3 U
TRANS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	UG/L	1 U	0.5	1 U	1 U	1 U	1 U
VINYL CHLORIDE	UG/L	1 U	1 U	1 U	1 U	1 U	1 U
Inorganics							
CYANIDE, TOTAL	UG/L	10 U	10 U	10 U	10 U	10 U	10 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-5 Analysis Data for Sediment Samples at Site FTA

Field Sample ID	P2-SD-8
Lab Sample ID:	WP1985-13
Sample Date:	04/13/99

Analyte	Units	
VOCs		
1,1,1-TRICHLOROETHANE	UG/KG	7 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	7 U
1,1,2-TRICHLOROETHANE	UG/KG	7 U
1,1-DICHLOROETHANE	UG/KG	7 U
1,1-DICHLOROETHENE	UG/KG	7 U
1,2-DICHLOROETHANE	UG/KG	7 U
1,2-DICHLOROETHENE (TOTAL)	UG/KG	14 U
1,2-DICHLOROPROPANE	UG/KG	7 U
2-BUTANONE	UG/KG	14 UJ
2-HEXANONE	UG/KG	14 U
4-METHYL-2-PENTANONE	UG/KG	14 U
ACETONE	UG/KG	14 U
BENZENE	UG/KG	7 U
BROMODICHLOROMETHANE	UG/KG	7 U
BROMOFORM	UG/KG	7 U
BROMOMETHANE	UG/KG	7 UJ
CARBON DISULFIDE	UG/KG	7 U
CARBON TETRACHLORIDE	UG/KG	7 U
CHLOROBENZENE	UG/KG	7 U
CHLOROETHANE	UG/KG	7 U
CHLOROFORM	UG/KG	7 U
CHLOROMETHANE	UG/KG	7 U
CIS-1,3-DICHLOROPROPENE	UG/KG	7 U
DIBROMOCHLOROMETHANE	UG/KG	7 U
ETHYLBENZENE	UG/KG	7 U
METHYLENE CHLORIDE	UG/KG	7 U
STYRENE	UG/KG	7 U
TETRACHLOROETHENE	UG/KG	7 U
TOLUENE	UG/KG	7 U
TOTAL XYLEMES	UG/KG	21 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	7 U
TRICHLOROETHENE	UG/KG	7 U
VINYL CHLORIDE	UG/KG	7 U
Metals		
ALUMINUM	MG/KG	2230
ARSENIC	MG/KG	0.97
BARIUM	MG/KG	15.3
BERYLLIUM	MG/KG	0.16 B
CADMIUM	MG/KG	0.18 U
CALCIUM	MG/KG	279

Organic Qual.:U=not detected,B=in blank,J= estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-5 Analysis Data for Sediment Samples at Site FTA

Field Sample ID:	P2-SD-8
Lab Sample ID:	WP1985-13
Sample Date:	04/13/99

Analyte	Units	
CHROMIUM	MG/KG	4.2 J
COBALT	MG/KG	2.5 J
COPPER	MG/KG	2.1 J
IRON	MG/KG	5400
LEAD	MG/KG	5 L
MAGNESIUM	MG/KG	1480 L
MANGANESE	MG/KG	176
MERCURY	MG/KG	0.02 J
NICKEL	MG/KG	13.3
POTASSIUM	MG/KG	359
SELENIUM	MG/KG	0.19 U
SILVER	MG/KG	0.32 B
SODIUM	MG/KG	31.8
THALLIUM	MG/KG	0.34 U
VANADIUM	MG/KG	6 J
ZINC	MG/KG	17.3
TPH		
GASOLINE RANGE ORGANICS	MG/KG	3 U
TOTAL PETROLEUM HYDROCAR	MG/KG	15 J
Pesticides/PCBs		
4,4'-DDD	UG/KG	4 U
4,4'-DDE	UG/KG	4 U
4,4'-DDT	UG/KG	4.4
ALDRIN	UG/KG	2 U
ALPHA BHC	UG/KG	2 U
ALPHA-CHLORDANE	UG/KG	2 U
BETA BHC	UG/KG	2 U
DELTA BHC	UG/KG	2 U
DIELDRIN	UG/KG	4 U
ENDOSULFAN I	UG/KG	2 U
ENDOSULFAN II	UG/KG	4 U
ENDOSULFAN SULFATE	UG/KG	4 U
ENDRIN	UG/KG	4 U
ENDRIN ALDEHYDE	UG/KG	4 U
ENDRIN KETONE	UG/KG	4 UJ
GAMMA BHC	UG/KG	2 U
GAMMA-CHLORDANE	UG/KG	2 U
HEPTACHLOR	UG/KG	2 U
HEPTACHLOR EPOXIDE	UG/KG	2 U
METHOXYCHLOR	UG/KG	20 UJ
TOXAPHENE	UG/KG	40 U
AROCLOR 1016	UG/KG	20 U

Organic Qual.:U=not detected,B=in blank,J= estimated,D=diluted,P=>25% difference in GC col.

Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-5 Analysis Data for Sediment Samples at Site FTA

Field Sample ID	P2-SD-8
Lab Sample ID:	WP1985-13
Sample Date:	04/13/99

Analyte	Units	
AROCLOR 1221	UG/KG	40 U
AROCLOR 1232	UG/KG	20 U
AROCLOR 1242	UG/KG	20 U
AROCLOR 1248	UG/KG	20 U
AROCLOR 1254	UG/KG	20 U
AROCLOR 1260	UG/KG	20 U
Semi-Volatiles		
2-METHYLNAPHTHALENE	UG/KG	24 U
ACENAPHTHENE	UG/KG	5 J
ACENAPHTHYLENE	UG/KG	24 U
ANTHRACENE	UG/KG	13 J
BENZO(A)ANTHRACENE	UG/KG	65 J
BENZO(A)PYRENE	UG/KG	54 J
BENZO(B)FLUORANTHENE	UG/KG	99 J
BENZO(K)FLUORANTHENE	UG/KG	21 J
BENZO[G,H,I]PERYLENE	UG/KG	21 J
CHRYSENE	UG/KG	52 J
DIBENZ(A,H)ANTHRACENE	UG/KG	8
FLUORANTHENE	UG/KG	140
FLUORENE	UG/KG	6
INDENO(1,2,3-CD)PYRENE	UG/KG	26
NAPHTHALENE	UG/KG	24 U
PHENANTHRENE	UG/KG	68 J
PYRENE	UG/KG	120 J
Inorganics		
PH (LABORATORY)	PH	7.2
SOLIDS-TOTAL RESIDUE (TS)	WT %	81
CYANIDE, TOTAL	MG/KG	1 U
Grain Size		
CLAY	%	1.9
SILT	%	11.5
FINE SAND	%	15
MEDIUM SAND	%	22.1
COARSE SAND AND LARGER	%	49.5
Other		
TOTAL ORGANIC CARBON	MG/KG	1500

Organic Qual.:U=not detected,B=in blank,J= estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

**Table A-6 Analysis Data for Surface
Water Samples at Site FTA**

Field Sample ID	2-SW-1	2-SW-4	P2-SW-6	P2-SW-8	SW-DUP-1
Lab Sample ID:	WP1986-4	WP1986-1	WP1986-3	WP1986-2	WP1986-5
Sample Date:	04/14/99	04/13/99	04/14/99	04/13/99	04/14/99

Analyte	Units	2-SW-1	2-SW-4	P2-SW-6	P2-SW-8	SW-DUP-1
VOCs						
1,1,1-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	UG/L	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHENE (TOTAL)	UG/L	2 U	2 U	2 U	2 U	2 U
1,2-DICHLOROPROPANE	UG/L	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	UG/L	0	0	0	2 J	2 J
ACETONE	UG/L	3 B	6 B	6 B	3 B	5 B
BENZENE	UG/L	1 U	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
BROMOFORM	UG/L	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	UG/L	1 U	1 U	1 U	1 U	1 U
CARBON TETRACHLORIDE	UG/L	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	UG/L	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	UG/L	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	UG/L	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	UG/L	1 U	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	UG/L	2	2	2	2	2
STYRENE	UG/L	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	UG/L	1 U	1 U	1 U	1 U	1 U
TOLUENE	UG/L	1 U	1 U	1 U	1 U	1 U
TOTAL XYLEMES	UG/L	3 U	3 U	3 U	3 U	3 U
TRANS-1,3-DICHLOROPROPENE	UG/L	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	UG/L	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	UG/L	1 U	1 U	1 U	1 U	1 U
Metals						
ALUMINUM	UG/L	327	124	114	91.1 J	77.6 J
ANTIMONY	UG/L	1.81 U	1.81 U	1.81 U	1.81 U	1.81 U
ARSENIC	UG/L	2.07 U	2.9 J	2.07 U	2.07 U	2.07 U
BARIUM	UG/L	40.8 J	30.8 J	30 J	34 J	35.6 J
BERYLLIUM	UG/L	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
CADMIUM	UG/L	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
CALCIUM	UG/L	13900	22100	19800	13200	13600

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-6 Analysis Data for Surface Water Samples at Site FTA

Field Sample ID	2-SW-1	2-SW-4	P2-SW-6	P2-SW-8	SW-DUP-1
Lab Sample ID:	WP1986-4	WP1986-1	WP1986-3	WP1986-2	WP1986-5
Sample Date:	04/14/99	04/13/99	04/14/99	04/13/99	04/14/99

Analyte	Units	2-SW-1	2-SW-4	P2-SW-6	P2-SW-8	SW-DUP-1
CHROMIUM	UG/L	0.59 U	0.68 J	0.89 J	0.85 J	0.59 U
COBALT	UG/L	0.64 U	0.69 J	1 J	0.64 U	0.64 U
COPPER	UG/L	2.9 B	3.6 J	3.6 J	4.1 J	3.8 J
IRON	UG/L	532	225	169	149	174
LEAD	UG/L	1.09 U	2 J	1.09 U	1.09 U	1.09 U
MAGNESIUM	UG/L	4940	6810	6380	4440	4800
MANGANESE	UG/L	64.4	155	34.4	16.2	20
MERCURY	UG/L	0.02 J	0.02 U	0.02 U	0.02 U	0.02 U
NICKEL	UG/L	2 J	1.4 J	1.5 J	1.4 J	1.8 J
POTASSIUM	UG/L	1360	2130	1600	1360	1620
SELENIUM	UG/L	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U
SILVER	UG/L	0.69 U	0.69 U	0.69 U	0.69 U	0.69 U
SODIUM	UG/L	8210	7530	7540	7580	8000
THALLIUM	UG/L	4.49 U	5.7 J	4.49 U	4.49 U	4.49 U
VANADIUM	UG/L	0.62 U	0.97 B	0.62 U	0.62 U	0.62 U
ZINC	UG/L	14.4 J	6.3 J	13.5 J	6.4 J	10.4 J
TPH						
GASOLINE RANGE ORGANICS	UG/L	10 U	10 U	10 U	10 U	10 U
TOTAL PETROLEUM HYDROCAR	UG/L	50 U	60 U	400 J	50 U	58
Pesticides/PCBs						
4,4'-DDD	UG/L	0.1 U	0.1 U	0.14 J	0.1 U	0.1 U
4,4'-DDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	UG/L	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ
ALDRIN	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
ALPHA BHC	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
ALPHA-CHLORDANE	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
BETA BHC	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
DELTA BHC	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
DIELDRIN	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
ENDOSULFAN II	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	UG/L	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ	0.1 UJ
ENDRIN ALDEHYDE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	UG/L	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
GAMMA BHC	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
GAMMA-CHLORDANE	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
HEPTACHLOR	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
HEPTACHLOR EPOXIDE	UG/L	0.06 U	0.06 U	0.06 U	0.05 U	0.06 U
METHOXYCHLOR	UG/L	0.6 UJ	0.6 UJ	0.6 UJ	0.5 UJ	0.6 UJ

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

Table A-6 Analysis Data for Surface Water Samples at Site FTA

Field Sample ID	2-SW-1	2-SW-4	P2-SW-6	P2-SW-8	SW-DUP-1
Lab Sample ID:	WP1986-4	WP1986-1	WP1986-3	WP1986-2	WP1986-5
Sample Date:	04/14/99	04/13/99	04/14/99	04/13/99	04/14/99

Analyte	Units	2-SW-1	2-SW-4	P2-SW-6	P2-SW-8	SW-DUP-1
TOXAPHENE	UG/L	1.1 U	1.1 U	1.1 U	1 U	1.1 U
AROCLOR 1016	UG/L	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
AROCLOR 1221	UG/L	1.1 U	1.1 U	1.1 U	1 U	1.1 U
AROCLOR 1232	UG/L	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
AROCLOR 1242	UG/L	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
AROCLOR 1248	UG/L	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
AROCLOR 1254	UG/L	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
AROCLOR 1260	UG/L	0.6 U	0.6 U	0.6 U	0.5 U	0.6 U
Semi-Volatiles						
2-METHYLNAPHTHALENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
ACENAPHTHENE	UG/L	0.2 U	0.2 U	0.3 U	0.2 U	0.2 U
ACENAPHTHYLENE	UG/L	0.2 U	0.2 U	0.3 U	0.2 U	0.2 U
ANTHRACENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
BENZO(A)ANTHRACENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
BENZO(A)PYRENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
BENZO(B)FLUORANTHENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
BENZO(K)FLUORANTHENE	UG/L	0.2 U	0.2 U	0.3 U	0.2 U	0.2 U
BENZO[G,H,I]PERYLENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
CHRYSENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
DIBENZ(A,H)ANTHRACENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
FLUORANTHENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
FLUORENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
INDENO(1,2,3-CD)PYRENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
NAPHTHALENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
PHENANTHRENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
PYRENE	UG/L	0.2 UJ	0.2 UJ	0.3 UJ	0.2 UJ	0.2 UJ
Inorganics						
PH (LABORATORY)	PH	7.8	6.9	5.9	7.4	7.5
CYANIDE, TOTAL	UG/L	10 U	10 U	10 U	10 U	10 U

Organic Qual.:U=not detected,B=in blank,J=estimated,D=diluted,P=>25% difference in GC col.
 Inorganic Qual.:U=not detected,N=MS outside QC,B=Above IDL,below MDL

APPENDIX B

HUMAN HEALTH RISKS

**TABLE B-1 NONCANCER RISKS FOR FUTURE RESIDENT ADULTS
AT THE OLD LANDFILL, BAINBRIDGE**

CHEMICAL	INGESTION	DERMAL	INHALATION	TOTAL
Beryllium	5.5E-06	NA	NA	5.5E-06
1,2 Dichloroethene	5.2E-02	5.7E-04	NA	0.053
1,2 Dichloropropane	NA	NA	8.7E-03	8.7E-03
Chlorobenzene	0.23	0.02	1.2	1.5
Chloroform	6.8E-04	1.1E-04	8.7E-04	0.002
Manganese	7.5E+00	1.5E-02	NA	7.515
Methylene Chloride	1.1E-04	5.7E-07	1.2E-05	1.3E-04
Trichloroethene	NA	NA	NA	NA
Vinyl chloride	NA	NA	NA	NA
TOTAL				9.0

**TABLE B-2 CANCER RISKS FOR FUTURE ADULT RESIDENTS AT
THE OLD LANDFILL, BAINBRIDGE**

CHEMICAL	INGESTION	DERMAL	INHALATION	TOTAL
Beryllium	5.0E-08	NA	NA	5.0E-08
1,2 Dichloroethene	NA	NA	NA	NA
1,2 Dichloropropane	2.0E-07	2.4E-09	NA	2.0E-07
Chlorobenzene	NA	NA	NA	NA
Chloroform	1.8E-08	2.8E-09	3.3E-07	3.5E-07
Manganese	NA	NA	NA	NA
Methylene Chloride	2.2E-08	1.1E-10	7.2E-09	2.9E-08
Trichloroethene	2.7E-06	7.5E-07	2.0E-06	5.5E-06
Vinyl chloride	4.5E-05	3.6E-07	1.1E-05	5.6E-05
TOTAL				6.3E-05

TABLE B-3 NONCANCER RISKS FOR FUTURE RESIDENT CHILDREN AT THE OLD LANDFILL, BAINBRIDGE

CHEMICAL	INGESTION	DERMAL	TOTAL
Beryllium	1.3E-05	2.8E-06	1.6E-05
1,2 Dichloroethene	0.12	7.4E-03	0.13
1,2 Dichloropropane	NA	NA	NA
Chlorobenzene	0.54	0.31	0.85
Chloroform	0.002	1.5E-03	0.003
Manganese	17.000	3.8E-02	17.038
Methylene Chloride	2.7E-04	6.6E-06	2.7E-04
Trichloroethene	NA	NA	NA
Vinyl chloride	NA	NA	NA
TOTAL			18.0

TABLE B-4 CANCER RISKS FOR FUTURE CHILDREN RESIDENTS AT THE OLD LANDFILL, BAINBRIDGE

CHEMICAL	INGESTION	DERMAL	TOTAL
Beryllium	2.4E-08	5.1E-09	2.9E-08
1,2 Dichloroethene	NA	NA	NA
1,2 Dichloropropane	9.3E-08	6.4E-09	1.0E-07
Chlorobenzene	NA	NA	NA
Chloroform	8.4E-09	7.8E-09	1.6E-08
Manganese	NA	NA	NA
Methylene Chloride	1.0E-08	2.6E-10	1.1E-08
Trichloroethene	1.3E-06	2.3E-06	3.5E-06
Vinyl chloride	2.1E-05	7.3E-07	2.2E-05
TOTAL			2.5E-05

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TABLE B-5 NONCANCER RISKS FOR FUTURE RESIDENT ADULTS AT THE FIRE TRAINING AREA, BAINBRIDGE

CHEMICAL	INGESTION	DERMAL	INHALATION	TOTAL
Arsenic	0.3	5.3E-04	NA	0.3
Beryllium	5.5E-04	1.1E-05	NA	5.6E-04
Iron	3.6	0.1	s	3.7
Manganese	5.3	0.1	NA	5.3
Benzo(a)anthracene	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Indeno(1,2,3,c-d)pyrene	NA	NA	NA	NA
1,1,2,2 Tetrachloroethane	NA	NA	NA	NA
TOTAL				9.2

TABLE B-6 CANCER RISKS FOR FUTURE ADULT RESIDENTS AT THE FIRE TRAINING AREA BAINBRIDGE

CHEMICAL	INGESTION	DERMAL	INHALATION	TOTAL
Arsenic	5.1E-05	1.0E-07	NA	5.1E-05
Beryllium	5.0E-06	1.0E-07	NA	5.1E-06
Iron	NA	NA	NA	NA
Manganese	NA	NA	NA	NA
Benzo(a)anthracene	8.6E-07	NA	2.6E-08	8.8E-07
Benzo(a)pyrene	8.6E-06	NA	8.9E-08	8.7E-06
Benzo(k)fluoranthene	8.6E-08	NA	1.2E-06	1.3E-06
Chrysene	8.6E-09	NA	4.1E-08	5.0E-08
Indeno(1,2,3,c-d)pyrene	8.6E-07	NA	2.5E-09	8.6E-07
1,1,2,2 Tetrachloroethane	7.0E-06	NA	6.3E-06	1.3E-05
TOTAL				8.1E-05

TABLE B-7 NONCANCER RISKS FOR FUTURE RESIDENT CHILDREN AT THE FIRE TRAINING AREA, BAINBRIDGE

CHEMICAL	INGESTION	DERMAL	TOTAL
Arsenic	0.6	1.3E-03	0.6
Beryllium	1.3E-03	2.8E-05	1.3E-03
Iron	8.4	0.2	8.6
Manganese	12.4	0.3	13.0
Benzo(a)anthracene	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA
Chrysene	NA	NA	NA
Indeno(1,2,3,c-d)pyrene	NA	NA	NA
1,1,2,2 Tetrachloroethane	NA	NA	NA
TOTAL			22.0

**TABLE B-8 CANCER RISKS FOR FUTURE CHILDREN RESIDENTS
AT THE FIRE TRAINING AREA BAINBRIDGE**

CHEMICAL	INGESTION	DERMAL	TOTAL
Arsenic	2.4E-05	5.2E-08	2.4E-05
Beryllium	2.4E-06	5.1E-08	2.4E-06
Iron	NA	NA	NA
Manganese	NA	NA	NA
Benzo(a)anthracene	4.0E-07	NA	4.0E-07
Benzo(a)pyrene	4.0E-06	NA	4.0E-06
Benzo(k)fluoranthene	4.0E-08	NA	4.0E-08
Chrysene	4.0E-09	NA	4.0E-09
Indeno(1,2,3,c-d)pyrene	4.0E-07	NA	4.0E-07
1,1,2,2 Tetrachloroethane	3.3E-06	NA	3.3E-06
TOTAL			3.4E-05

COMMENT REPSONSE DOCUMENT
for
HUMAN AND ECOLOGICAL RISK CHARACTERIZATION at IR SITES 1 AND 2–
OLD BASE LANDFILL AND FIRE TRAINING AREA
NAVAL TRAINING CENTER-BAINBRIDGE

Ref: Draft Human and Ecological risk Characterization Report, July 1999
EPA Review Comments, August 19, 1999

Comment:

1. Section 1.3: The report should clarify whether low-flow methods were used during groundwater sampling.

Response:

U.S. EPA defined low-flow methodology was employed during the ground-water sampling effort. A statement to that effect has been added to the text.

Comment:

2. Section 2: Given the amount of calculations that have been performed, it would be far simpler and clearer to perform the risk assessment on the current data, and then compare that to the earlier risk assessment, rather than trying to take some of the old risks and add them to some of the new risks. By screening the new data, the EPA Toxicologist obtained the following COPCs:

Old Base Landfill groundwater: arsenic, iron, manganese, cis-1,2-DCE, TCE, heptachlor, benzene, chlorobenzene, vinyl chloride

Fire Training Area groundwater: antimony, iron, manganese

Response:

The objective of this risk characterization was to assess potential changes in risk levels based on current ground-water quality conditions. An additional risk screening based on 1999 data as recommended by the US EPA would have added some COPC and eliminated others previously noted in the Remedial Investigation. However, evaluating risk based on 1999 data would still not have permitted a direct 1:1 comparison to risks computed earlier using other screening values because of changes to the COPC list.

Maximum concentration comparisons of previously identified COPC were used to focus quantification of risks on the COPC undergoing temporal concentration changes. With arsenic as the exception, maximum concentrations of previously identified COPC have decreased, most by over 20%.

Comment:

3. Section 2.2.1: The most recent toxicity factors should be used.

Response:

The Navy recognizes that revisions to RfD and SF values have been made following finalization of the Remedial Investigation and Risk Assessment, however, in order to be able to directly compare risks from the 1991/1994 data with 1999 data, the original reported RfDs and SFs were used to calculate 1999 risks in this document. Recalculation of the risks using updated risk factors was not the objective of this Human Health Risk Characterization report.

The Navy has added text in section 1.1 to clarify the risk comparison objectives.

Comment:

4. Section 2.2.2: It is not clear what numbers were used as the EPCs. From the new data, the EPA Toxicologist has generated the following:

Old Base Landfill

Chemical	EPC ($\mu\text{g/l}$)
Arsenic	1.3 (UCL)
Iron	22700 (normal UCL)
Manganese	5470 (maximum)
cis-1,2-Dichlorethene	6.2 (normal UCL)
Trichloroethene	2 (maximum)
Heptachlor	0.035 (UCL)
Benzene	0.55 (UCL)
Chlorobenzene	78 (maximum)
Vinyl chloride	0.5 (data uniform)

Fire Training Area

Chemical	EPC ($\mu\text{g/l}$)
Antimony	1.7 (UCL)
Iron	39400 (maximum)
Manganese	3870 (maximum)

Response:

The reviewer is correct. EPCs used in the risk characterization have been identified in the revised document. The maximum concentration measured in the 1999 sampling and shown in the COPC identification table (Table 2-2) was used as the EPC. Shapiro-Wilkes distribution tests and 95 % UCLM calculations were not performed. The use of maximum concentrations is more conservative than using 95 % UCLM, and as will be discussed later, the conclusions of this assessment have not have been impacted regardless of the methodology followed.

Comment:

5. Tables 2-1 and 2-2: Antimony and thallium should also be listed for the OBL; thallium and chloroform should also be listed for the FTA.

Response:

It is recognized that these COPC would require an assessment using present screening criteria based on 1999 data. However as noted in the response to Comment 2, this risk assessment was designed to focus on the COPC identified in the Remedial Investigation. E&E (1999) did not identify antimony and thallium in the OBL nor thallium and chloroform in the FTA as COPC.

The maximum OBL antimony reported based on 1991/1994 data was 32.4 ug/L, while the maximum (and only detected concentration from all wells) measured in 1999 was 3.3 ug/L. Both of these are comparable to 1/10th of the noncancer RBC at 1.5 ug/L. Consequently, it can be seen that antimony concentrations in OBL wells have dropped in concentration. While the chloroform Region III RBC is 0.15 ug/L, this chemical was never detected above standard detection limits in 1999 (0.5 – 1.0 ug/L). Identification of a chemical that was never detected as a COPC would be highly irregular. Lastly the thallium noncancer Region III RBC is 2.6 ug/L, thus values would be screened against 1/10th of this value or 0.26 ug/L. The standard detection limit for thallium is approximately 4.5 ug/L. At the OBL area in 1999 there were two detections of thallium, 7.3 ug/L in 1-GW-8, and 8.0 ug/L in 1-GW-9. The maximum thallium detected in 1991/1994 at the OBL was 2.1 ug/L. In the FTA area, the maximum thallium detected in 1991/1994 was 1.0 ug/L, compared to a single hit in 1999 of 11.9 ug/L. The 1999 thallium detection was in a duplicate of well 2-GW-4, in which the detection limit of 4.5 ug/L was reported. Inclusion of thallium as a new COPC would not have significantly changed the conclusions of this report.

Comment:

6. Tables 2-3 through 2-6, and Appendix B: The old risks should have been adjusted in accordance with June 1999 comments on the FS. Also, the EPA Toxicologist could not duplicate many of the risks in Appendix B, perhaps because the EPCs and toxicity factors were not shown. Attachments to this letter demonstrate the sort of current risk assessment that should replace Appendix B. With these changes, the tables would be as follows:

Table 2-3

Chemical	1991/1994	1999	1991/1994	1999
	Cancer	Cancer	Hazard	Hazard
	Risks	Risks	Quotient	Quotient
1,2-Dichloroethene	NA	NA	0.04	0.02
1,2-Dichloropropane	8.7E-7	NC	0.04	NC
1,4-Dichlorobenzene	4.7E-6	NC	0.02	NC
Chlorobenzene	NA	NA	0.4	0.3
Chloroform	6.2E-6	NC	1.8	NC

Manganese	NA	NA	9.8	7.5
Methylene chloride	7.8E-7	NC	0.003	NC
Trichloroethene	1.7E-6	5E-7	0.04	0.01
Vinyl chloride	2E-5	1.5E-5	NA	NA
Antimony	NA	NA	2.1	NC
Thallium	NA	NA	0.4	NC
Arsenic	1.8E-5	2.3E-5	0.09	0.1
Iron	NA	NA	2.3	2.1
TOTAL	7.8E-5	4E-5	17	10

NC = Risk not calculated because chemical was not detected or was below screening level

Table 2-4

Chemical	1991/1994	1999	1991/1994	1999
	Cancer	Cancer	Hazard	Hazard
	Risks	Risks	Quotient	Quotient
1,2-Dichloroethene	NA	NA	0.1	0.04
1,2-Dichloropropane	4E-7	NC	NA	NC
1,4-Dichlorobenzene	1.9E-6	NC	0.03	NC
Chlorobenzene	NA	NA	0.4	0.37
Chloroform	1.4E-7	NC	0.03	NC
Manganese	NA	NA	23	17
Methylene chloride	2.6E-7	NC	0.007	NC
Trichloroethene	4.3E-7	1E-7	0.09	0.02
Vinyl chloride	7.1E-6	5E-6	NA	NA
Antimony	NA	NA	4.9	NC
Thallium	NA	NA	0.95	NC
Arsenic	8.6E-6	1.1E-5	0.2	0.28
Iron	NA	NA	5.3	4.8
TOTAL	2E-5	1.8E-5	35	23

NC = Risk not calculated because chemical was not detected or was below screening level

Table 2-5

Chemical	1991/1994	1999	1991/1994	1999
	Cancer	Cancer	Hazard	Hazard
	Risks	Risks	Quotient	Quotient
Arsenic	2E-5	NC	0.1	NC
Iron	NA	NA	7.4	3.7
Manganese	NA	NA	7.7	5.3
Benz[a]anthracene	8.9E-6	NC	NA	NA
Benz[a]pyrene	1.7E-4	NC	NA	NA
Benz[k]fluoranthene	1E-6	NC	NA	NA
Chrysene	1E-7	NC	NA	NA
Indeno[1,2,3-c,d]pyrene	1.7E-5	NC	NA	NA
1,1,2,2-Tetrachloroethane	2.6E-5	NC	3E-3	NC

Thallium	NA	NA	0.39	NC
Chloroform	8.8E-6	NC	2.5	NC
Antimony	NA	NA	NC	0.1
TOTAL	2E-4	NA	19	9.2

NC = Risk not calculated because chemical was not detected or was below screening level

Table 2-6

Chemical	1991/1994	1999	1991/1994	1999
	Cancer	Cancer	Hazard	Hazard
	Risks	Risks	Quotient	Quotient
Arsenic	9.3E-6	2.4E-5	0.24	NC
Iron	NA	NA	17	8.6
Manganese	NA	NA	18	12.6
Benz[a]anthracene	4E-6	NC	NA	NA
Benz[a]pyrene	8E-5	NC	NA	NA
Benz[k]fluoranthene	8E-7	NC	NA	NA
Chrysene	8E-8	NC	NA	NA
Indeno[1,2,3-c,d]pyrene	8E-6	NC	NA	NA
1,1,2,2-Tetrachloroethane	6.2E-6	NC	6E-3	NA
Thallium	NA	NA	0.9	NC
Chloroform	2E-7	NC	0.04	NC
Antimony	NA	NA	NC	0.28
TOTAL	1E-4	NA	37	21

NC = Risk not calculated because chemical was not detected or was below screening level

Response:

Please refer to the response to EPA comment Number 3.

The intent of this risk characterization was to compare risks calculated in RI based on 1991 and 1994 data with the risks calculated using the latest available (1999) data. Toward that end, modifications that were commented on for the FS, and duplicating the exposure and toxicity tables originally shown in the RI were beyond the scoped objectives. Toxicity values and exposure parameters used for the calculation of 1999 risks were exactly those presented in the RI report. The only difference in risks shown in the draft report are that the maximum concentrations were used to calculate risks in the draft report while 95 % UCLM was used in E&E (1999). As noted earlier, the use of maximum detected concentrations is more conservative than the 95 % UCLM, and conclusions derived from the assessment are the same regardless of which exposure point concentration is used.

Comment:

Sections 2.2.2.1 and 2.2.2.2 should be replaced by a comparison between the 1991/1994 data and risks, and the 1999 data and risks. In summary, the following points are relevant:

Iron and manganese levels have not changed substantially, and iron and manganese drive the risks at both areas. Therefore, the background levels of these metals will be relevant for

decision making.

Cancer risks are fairly stable at the OBL and seem to have dropped at the FTA.

Trace to low levels of chlorinated ethenes and benzenes are still detectable in OBL wells; the cancer risks have been fairly stable between 1E-5 and 1E-4.

The PAHs and arsenic that formerly drove the cancer risks at the FTA were not detected in the 1999 samples.

Response:

The Navy is in agreement with the relevant points identified in EPA comment Number 7 above. The Human Health Risk Characterization arrives at the same relevant points, albeit using different methodologies. The following examples are provided:

The draft human health and ecological risk characterization recognized that iron and manganese have changed, but not substantially, and that noncancer risks are driven by these metals. For example, the OBL text notes "...iron noncancer risks did not change by more than 20 percent...". Manganese is noted with the statement "Noncancer hazard indices are driven primarily by manganese" and the statement is made "There is evidence that concentrations of iron and manganese have decreased..., although noncancer risks are still high." Similarly, with regards to the FTA, the statement "These hazard indices are driven primarily by iron and manganese." These conclusions are no different than those expressed in the EPA comments. Based on a review of limited upgradient groundwater data it does not appear that this potential background information would affect these conclusions. However, the Navy will give consideration to further evaluating background levels of these metals in the course of long-term monitoring.

The conclusions regarding cancer risks can be found in the appropriate risk comparison tables (Tables 2-3 through 2-6), and lead to the same conclusions mentioned in the EPA comment. No PAHs were detected in 1999, thus no PAH risks were found at the FTA.

Comment:

8a. The 1999 round of data indicates that some contaminant concentrations have decreased in the receiving streams. However, it uncertain whether this decrease represents a trend or if the contaminants remaining in the stream represents a secondary source. In addition some metals concentrations increased. When a landfill is capped, it creates anaerobic conditions that can free previously bound metals contamination.

Response:

Generally, once a landfill is covered its contents enter an anaerobic state within 6 to 24 months, given at least two feet of cover (Corbitt, 1990; Stegen, 1987). This anaerobic state exists within almost all of the landfill material with the possible exception of a minimal depth near the surface where gas venting occurs (Weiss, 1974). Plaster (1992) notes that the top two feet of soil are the most microbiologically active due to the presence of air, water and food.

The Navy ceased operation of NTC Bainbridge in 1976. The landfill has been idle since then, with a nominal two feet of cover in place over the waste. When the Navy capped the old landfill with impermeable HDPE membrane in 1995, water infiltration was essentially eliminated (thereby reducing the carrier for leachate), but the cap is vented to the atmosphere to release any buildup of gases produced by decomposition.

Based on the references cited, it is unlikely the anaerobic state of the landfill changed significantly when capped, since most of the waste had reached an anaerobic state years earlier. Any soils that may have changed from aerobic to anaerobic conditions would have been in the top few feet, where little or no waste was present.

The maximum nickel concentration measured in sediment in 1999 was 217 mg/kg in sample 1-SD-8. It is noteworthy that the next highest nickel concentration in 1999 was the field duplicate of this same sample location at 127 mg/kg, thus this location may represent a localized “hot spot” not previously detected. All other samples in 1999 and in the 1991/1994 data set showed nickel in sediment at 57 mg/kg or less.

A quick review of other sediment metals shows that at least eleven metals show lower concentrations in 1999 compared to 1991/1994. These metals include aluminum, barium, beryllium, cadmium, chromium, cobalt, lead, mercury, manganese, vanadium and zinc. Other than the nickel discussed above three other metals exhibited higher concentrations in 1999, specifically arsenic (5.9 mg/kg in 1991/1994 and 6.9 mg/kg in 1999), copper (47.6 mg/kg in 1991/1994 and 52.2 mg/kg in 1999), and thallium (1.2 mg/kg in 1991/1994 and 1.7 mg/kg in 1999). None of these differences are significant, and may represent natural variation in stream metal concentrations.

It is not to be expected that all metals will decrease in concentrations at the same rate. Over time it should be expected that sediment metal concentrations will start to show trends (of an effective static range of concentrations) similar to that found with arsenic, copper and thallium. None of these metals have been identified as a “significant risk driver” for ecological receptors.

Comment:

8b. At this point there are two options. The Navy can enter a feasibility study to clean up the streams or it can continue monitoring until a determination of a decreasing trend or a secondary source can be made. It should be noted that if the Navy chooses to monitor the stream, performing a cleanup may still be necessary. A meeting or conference call should be held to scope the next step.

Response:

An August 1999 Rapid Bioassessment Protocol (RBP) was performed by the US Fish and Wildlife Service to document the existing physical habitat and biological conditions of the NTC streams. A degraded benthic community was acknowledged without investigating whether or not landfill-related contamination is the causative factor for the degradation. The RBP also identified that stream bank stabilization using concrete as a major influencing factor contributing to the poor physical habitat; the

close proximity to MD route 276 was also cited as a likely source for additional contamination contributing to in-stream stresses. Based on the situation, the Navy is proposing additional monitoring of the stream that separates the Old Base Landfill from MD route 276. Prior to initiating further stream monitoring, the Navy will work with EPA and the Biological Technical Assistance Group (BTAG) to refine the conceptual model, benchmark exposure and toxicity criteria, and assessment endpoints.

References

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